## BLUE BOOK

DECEMBER 1946

HARDINGE ELMIRA. N.Y.

DV59 HIGH SPEED PRECISION LATHE

HARDINGE

HARDINGE

DOVETAIL BED

HARDENED AND GROUND STEEL



Three-Point

Bed Mounting Headstock with

Center Drive

Patented Positive Lock

Slide Rest

**Full Bearing** 

Tailstock Spindle

1" Collet Capacity

9" Swing

Speeds to 4000 r.p.m.

GREATEST ADVANCEMENT IN PRECISION LATHE CONSTRUCTION





## Designed for EFFICIENCY

TO PRODUCE MOBE OF A GREATER VARIETY THRU EASE OF PRECISION SET UP AND OPERATION

The Rivett No. 104 is a simple, power-driven grinder suitable for tool making and precision manufacturing. Operations of widely varying nature can be quickly set-up and efficiently ground on one or many pieces. Interchangeable brackets are selectively mounted on the cross slide for internal, external, or concentric grinding in straight, taper, face or shoulder form.



External Bracket



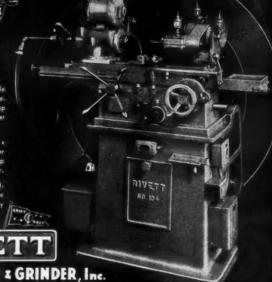
Internal, External Turret

#### RANGE

Internal spindles of suitable design and speed may be selected for hole grinding up to approximately 3" diameter and 4" length.

External bracket with 7" a 1/2" wheel may be used for on-center or chucked work up to approximately 3" diameter.

 Turret for concentric grinding of hole or outside surface is limited to such work as may be chucked.

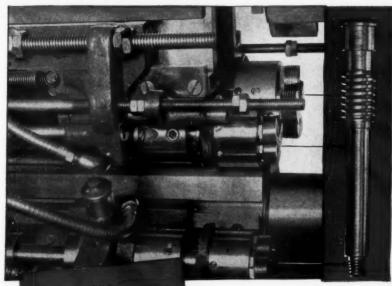


RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON . BOSTON . MASS . U.S. A

Write for Bulletin 104



### VERS-O-TOOLS

#### Here is a sample of Accurate, Fast Production

This valve stem, made from type 303 stainless steel bar stock, is 6½" long by ½" diameter, requires 11 separate precision operations.

separate precision operations.
With Vers-O-Tools, an Acme-Gridley Bar Automatic does all these 11 operations in 49 seconds machine time—73 finished pieces per hour.

Vers-O-Tools are standard selfopening heads for high speed precision operations on automatics. They use circular chasers (ground thread) and circular cutters, for threading, end turning and forming, knurling, burnishing and other operations.

Precision regrinding of chasers and cutters is controlled by a micrometer grinding gage, and reground chasers are inserted in the head in one minute. After replacing chasers, the first piece is production—no cutting and trying needed.

Catalog D-42-C gives full details

Catalog D-42-C gives full details on this modern cost-reducing equipment for all types of automatic machines.

## The NATIONAL ACME CO.

Acmo-Gridisy Bar and Chucking Automatics:
1-6-5 and 8 Spindle - Nydranic Thread
Belling Machines - Antomatic Threading Disand Tags - The Chromating - Unit, Mature Starter
and Control Stating Suitches - Solinoids
Contribuges - Solitact Manufacturing

## **ARMSTRONG** Quality TOOLS



ARMSTRONG TOOL HOLDERS Permanent, multi-purpose tools, for every operation on Lathes, Planers, Slotters and Shapers.

ARMSTRONG HIGH SPEED Ready-to-grind Bits... Ground Cutters.
ARMALOY Cost Alloy CUTTER-BITS ARMIDE Carbide-Tipped CUTTERS 6 cutter shapes, 12 sizes—2 grades.

**ARMSTRONG Turret Lathe and** Screw Mechine TOOL HOLDERS Drill Holders, Cutter Holders, Finishing and Knurling Tools for standard operations



ARMSTRONG Drop Forged DOGS
Lathe Dogs, Milling Machine Dogs, and Clamp Dogs, 12 types, all sizes.

ARMSTRONG Drop Forgod "C" CLAMPS Heavy Duty, Medium Serv-

ice, Deep Throat, and Tool Makers' types in all sizes. Also Machinists' Clamps.

ARMSTRONG Setting Up

Tools
A complete line of Drop
Forged Strap Clamps, Planer
and Bracing Jacks and T-slot
Bolts.

ARMSTRONG Drop Forged

Eye Bolts
Plain or shoulder pattern.
Blank or Threaded. 14 sizes, Drop Forged and heat treated.



ARMSTRONG Ratchet Drilla All steel wearing parts hard-ened. Packer, Railroad, Standard, and Short types, both plain and reversit

ARMSTRONG Drop Forged

Wrenches Both Carbon and Alloy Steel. Over 100 types in all sizes. Improved designs, steels, and heat treating ... stronger.

ARMSTRONG Detechable **Socket Wrenches** 

All sizes and types with driv-ing handles, extensions, and drop forged ratchets. Sold singly or in cased sets.

ARMSTRONG Machine

Shop Specialties Drill Drifts, Tool Posts, Drill Holders, Cutter Grinding Holders, and Tool Makers Vises.



Better Pipe Tools. A complete line, each a better tool with hardened, alloy or drop forged parts wherever they will add to strength or tool life. ARMSTRONG BROS. TOOL CO.

"The Tool Holder People" 308 N. FRANCISCO AVE. CHICAGO 12. U.S.A. Eastern Whie and Sales 199 Lalayette St., New York 12, N. Y. Pacific Coast White and Sales Office 1275 Mission St., San Francisco 3, Calif.

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Published Monthly

Volume 42, No. 12

#### DECEMBER 1946

Featured in This Issue -	-			-	-	-				129
Editor's Page										131
Design Considerations for By George L. Snyder	Wel	ded	Ma	chin	ery	Par	ts	•	•	135
Aluminum Pallets By T. O. Palmer	-		-				*	*		159
Carbide Lathe Center Tip	Prole	ong	Life	e of	Tul	be F	lari	ng 1	lool	168
Letter from England - By Robert Hutcheson	0	•	-		•	•		•	*	175
New Method of Measuring	g Vis	ual	Apt	itud	le fo	or S	peci	fic J	obs	185
Precision Measurement - By Warren Baker	•	-	-	-	-	-			•	189
New Silicone Rubber Has	Man	y In	ndus	tria	A A	plic	atio	ns		221
Basic Requirements of Lui By Walter C. Bauer, M.I		ting	Oil	Mo	inte	nan	ce		-	229
Key Facts About Keys - By H. F. Williams	-	•	•		*					246
The Foremanship Forum By Edmund Mottershead		٠	-	~	٠	٠	٠	-		260
Better Vision Reduces Ac By Ernest W. Fair	ciden	its	-	٠	-	-	*	•	-	265
What's New in Metal Wo	rking	- 1			*			-		270
Shop Hints	*	-		*	*	*	*	-	-	285
Let's Talk Shop	*			-	*	*	*			291
Available Literature -				*			-			356
Mechanics Through the A	ges			-			-	-		364
Advertiser's Products Inde	x -		-			-			-	390
Index to Advertisers -										398



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Without obligation, please send us a free sample kit of one tube of CMD Center Point Lube and one tube of CMD Center Point Oil. Also, send Catalog describing CMD Helical Groove Centers.

NAM	E	 	 	 
FIRM	NAME	 	 	 
ADDR	ESS	 	 	 



## No.6. The Puzzle of the Counterfeit Coin

Here are 9 coins and a scale. Eight of the coins are of equal weight - the ninth is counterfeit, weighs less.

The problem: What's the least number of weighings necessary to isolate the counterfeit coin?\*

Tricky, this one, but very apropos. For it's quite a trick today to solve some metal turning problems . , to remove metal more quickly, more economically, in the least number of operations.

The chances are that turning accounts for 25 per cent or more of all machining time in your plant.

There are cases in our files of savings of hundreds of \* The answer is 2.

dollars a month in the manufacture of a single part by the use of Jones & Lamson machines. Our machines are designed specifically for the most efficient use of carbide tools which can remove metal 200 to 500 per cent faster. We have solved many tough cost problems. Solving them is our business.

Be skeptical of the production efficiency of all metal turning equipment in your plant.

Telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



#### ONES & LAMSON

MACHINE COMPANY Springfield, Vermont, U.S.A. Manufacturer of: Universal Turret Lathes . Fay Automatic Lathas . Automatic Double-End Milling and Contering Machines-Automatic Throad Grinders . Optical Comparators . Automotic Opening Threading Dies and Chasers . Ground Thread Flat Rulling Dies

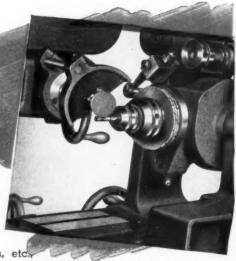
## Here are some of the things

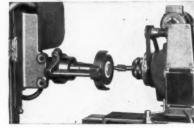
WITH THE NEW

## CINCINNATI MONOSET CUTTER

The CINCINNATI Monoset Cutter and Tool Grinder sharpens cutters, reconditions old cutters, and grinds new ones from the solid. Think what this means when you need a special cutter in a hurry! Because of the Mono set's built-in features, all operations required to produce the cutter can usually be completed in one chucking. There's no need for special attachments. All types of small- to medium-sized cutters, such as end mills, ream-

ers, counterbores, form cutters, etc., having straight, tapered, or spiral teeth, and involving convex or concave radii, can be assigned to the machine. The Monoset will help to reduce costly tie-ups of production machinery in your shop. The complete story of the Monoset's advantages, together with engineering specifications, may be obtained by writing for catalog M-1386-1.



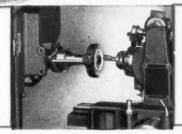








Cylindrical grinding the pilot diameter of a counterbore. Here the motor drive to the workhead is utilized.





Here the workhead spindle housing has been tilted vertically to grind the clearance angle of counterbore, using side of disc wheel.

#### THE CINCINNATI MILLING MACHINE CO.

MILLING MACHINES

BROACHING MACHINES

CUTTER SHARPENING MACHINES

December, 1946

MACHINE TOOL BLUE BOOK

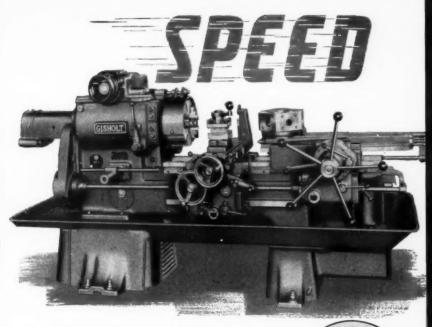


## Sure Grip-Quick Acting

In this Skinner Milling Machine Vise the movable jaw is controlled by a large hardened alloy steel screw. Ample bearings take end thrust. Work holding surfaces are faced with removable hardened and ground steel plates. Vise furnished in 5", 6", 7", and 8" sizes with or without swivel base. Write for catalog giving dimensions and prices.

**Prompt Delivery** 





#### with an easy change of pace to cut machining costs

Turret Lathe operation reaches a new high in efficiency in these newest Gisholt Ram Type machines. Whether it's starting, stopping, or reversing the spindle—or shifting gears for any of 12 spindle speeds—it's quick and effortless. It means less time lag between cuts—faster production—lower costs.

And because so little physical strength is required, the fatigue factor is reduced to a minimum. Output is more nearly constant throughout the day.

Speed and lower costs will be more important than ever in the days ahead. Now is a good time to get all the facts.

#### GISHOLT MACHINE COMPANY

1185 East Washington Avenue . Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . with Gisholt



THE GISHOLT SPEED SELECTOR enables you to indicate the sequence of spindle speeds to be used and then obtain the ideal speed for each cut when you want it, by merely touching finger trip. Hydraulic power shifts the gears instantly.

12 spindle speeds ranging from 28 to 730 r.p.m. are instant available in the Gisholt No. 4 Ram Type Turret Lathe show above. For high speed work, spindle speeds may be increas to 1460 r.p.m.





MILLING CAST IRON



on a Standard



## FAST!

#### **Kearney & Trecker CSM**

Kearney & Trecker CSM's are expressly designed for the most efficient use of Carbide Cutters on ferrous and non-ferrous metals.

On this job, because of the size of the workpiece and fixture — we selected a 50 hp. CSM plain model—and equipped with the proper cutter, it zipped through the cast iron workpiece easily and speedily. The details of the operation are given below:

OPERATION: Mill coolant trough
WORK PIECE: Milling machine table
MATERIAL: Close-grain, high-tensile cast iron
CUTTER: 6" dia., 10 tooth, carbide tipped slotting
CUTTER SPEED: 180 RPM
TABLE FEED: 21 IPM
DEPTH OF CUT: ½" to 1¾" (3/32"—1/4"
secth side.

METAL REMOVAL RATE: 15 cu. in. per minute at

NOTE the special fixture which provides maximum rigidity coupled with quick change set-ups on the workpiece and especially facilitates the loading and unloading of the workpiece on the machine.

CSM Milling Machines were designed to obtain the greatest benefits from modern cutting tools, and are now part of our line of standard models. The design has been developed after complete analyses of industry's problems of milling with carbide cutters. Machines are available in 20, 30 or 50 h.p. models in plain and vertical knee types.



Write for complete data on CSM machines — CATALOG CSM-20. Please indicate your business connection.

#### maximum depth of cut. Operation 1 . . .

Workpiece tilted to right in fixture. Angular coolant channel is climb milled. Maximum depth of cut: 1 34".

Operation 2 . . . . Workpiece tilted to left in fixture. . Angular coolant channel conventional

milled. Maximum depth of cut: 134".

Operation 3..

Workpiece held in horizontal petion in fixture. The two angular chanels now blended by climb millis







MILWAUKEE 14, WISCONSIN

BE READY FOR TOMORROW ... WITH CSM'

472

#### You Can Count On Custom Built Air Cylinders By Fenn

Fenn custom-built air cylinders can be made to do any reasonable job you want them to do (and in some cases the jobs need not be so reasonable at that). No longer do machine designers and production men have to fit their machines and jigs to standard air cylinders; air cylinders can be made to do what YOU want them to do, when you want them to do it, and how. FENN engineers have licked every special problem they have faced.

FENN engineers can lick your problem, too. They will take the conditions that face you and design an air cylinder that will give you a performance that meets every exacting requirement of efficiency and economy within budgeted space and at available pressures . . . all at a price just a fraction above the cost of standard cylinders. Orders are accepted in any quantity from one to a thousand or more. Delivery is fast. Write us (Dept. G) about your problems.



## The FENN Manufacturing Company

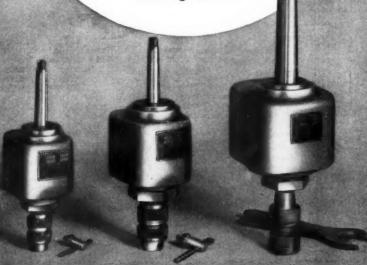
HARTFORD . CONNECTICUT.

## Jarvis High Speed Tapping Attachments

Jarvis Tapping Attachments are built for high speed production. Famous for long tap life and extreme accuracy, they will give dependable and efficient service.

When you use Jarvis High Speed Tappers, you save "time and taps".

> Send for New Catalog MFTI

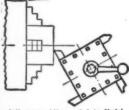




THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

APPING ATTACHMENTS . FLEXIBLE SHAFT MACHINES . GROUND ROTARY FILES
GUICK CHANGE CHUCKS AND COLLETS

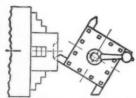
## EXTRA STATIONS FOR LATHE OUTPUT



34" square bit mounted in Model 41/2-S turret used in face work. Same tool is indexed to position and used for turning, as shown below.



Side of tool is used to take a \$" deep broad-face cut.



Same tool, pictured above, used for inside chamfer.



Three stations for each tool in an Enco lathe turret give you maximum use of standard ground tools. The need for specially ground bits is minimized. 12 stations spaced 30 degrees apart — means a threading tool can be set up with other tools. The threading tool will be square with the work while the compound is set over 30 degrees. Tool switching and costly re-centering are eliminated.

If you use carbide tools you will appreciate the extra tool-size capacity of Enco Turrets. A 16" swing lathe, for example, which ordinarily takes a 3%" tool bit, can use a 34" bit in the Enco tool block. More work per grind and longer tool life results.

Write Dept. 212 for complete catalog.



#### FACTURING COMPAN

GENERAL OFFICES AND FACTORY: 4522-24 FULLERTON AVE., DEPT. 212, CHICAGO 39, ILL.

EXPORT DIVISION: ENGINEERING BUILDING, 205 W. WACKER DRIVE, CHICAGO





2-SPINDLE 16" NO. 5-10,000 B. V. BENCH DRILL



4-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL



SLIDING HEAD FLOOR DRILL



WORLD'S MOST COMPLETE DRILL PRESS LINE



21" BOX COLUMN SLIDING HEAD FLOOR DRILL

16" NO. 3000 F. V. BOX COLUMN T-SPINDLE FLOOR DRILL



FLOOR DRILL



14" NO. 3000 F. V. SENSITIVE



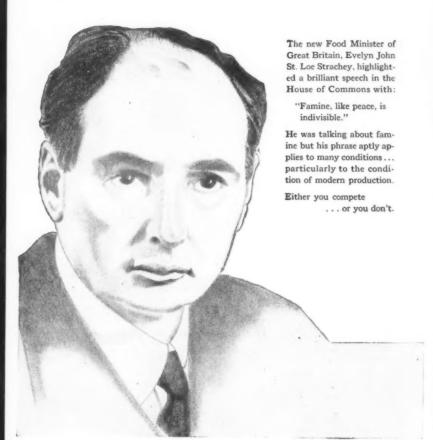
2-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

needs from one Hiere is an advantage in filling <u>all</u> your drill ource - particularly when those machines bear the CANEDY-OTTO trade-mark. That trade-mark on a drill pre- it your assurance to modern design, precision production, speed, and of handling, and leng, trouble-free service. Write us today for our catalog, giving detailed specifications on the complete CANEDY-OTTO Drill Press line.

CANEDY-OTTO MFG. COMPANY

CHICAGO HEIGHTS, ILLINOIS

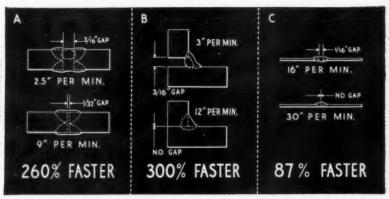
## then he said to himself: Either you eat ... or you don't





MR. STRACHEY: Here's food for thought to help you get the full measure of competitive advantage from arc welding:

#### GET GOOD FIT-UP



Care in cutting, forming and fitting up of plates and shapes to be welded pays big dividends. By improving fit-up of joints, you increase welding speed and thereby cut costs and minimize distortion.

**EXAMPLE A**—This square butt joint in %" plate with gap of 3/16" is made at an arc speed of 2.5" per min. With recommended gap of 1/32", speed is 9" per min. . . . 260% faster.

**EXAMPLE B**—This fillet weld in ½" plate, with 3/16" gap, is made at an arc speed of 3" per min. With no gap, speed is 12" per min. . . . 300% faster. Both welds have a 5/16" throat.

EXAMPLE C-This butt joint in 14 ga.

THE LINCOLN ELECTRIC COMPANY

sheet, with 1/16" gap, is made at an arc speed of 16" per min. With no gap, speed is 30" per min. . . . 87% faster.

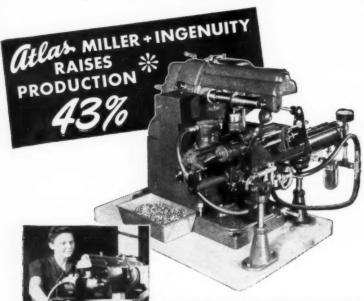
The sign of abundance. When you see 3 DOTS on an electrode, you know you have genuine "Fleetweld" . . . the world's leader for low cost, speed and quality. "Fleetweld" incorporates the full measure of Lincoln's pioneering research and worldwide engineering experience.

Handy pocket manual, giving "Fleet-Welding" procedures for all types of joints in mild steel, free on request. Ask for Bul. 444.

**DEPT. 503** 

CLEVELAND 1, OHIO

ARC WELDING



An Atlas miller equipped with Redmer Air Chucks at work in the Redmer plant in Chicago. The ingenious adaption of air chucks and drive freed operator's hands for loading and unloading . . . increased output 43%!



#### PROMPT DELIVERY!

Increased production facilities are bringing us back to normal on delivery schedules. Ask your Arias distributor for current inform

#### UNIQUE ADAPTATION SPEEDS MILLING OF PRECISION PARTS

Production zoomed 43% when Redmer Air Devices Corporation, Chicago, coupled their own air chucks with precise Atlas Bench Millers. The steady grip of the air chuck and the constant, steady speed of the air drive, teamed with the in-built accuracy of the Atlas milling machine, resulted in a steady flow of perfect precision parts. No rejects . . . no scrap!

Special Atlas adaptations are found in hundreds of plants. In practically every case they have made substantial savings in machine tool costs . . . increased precision

production. To capitalize similar opportunities for engineering ingenuity in your plant, write today for the latest Atlas catalog.

#### ATLAS PRESS COMPANY

1950 N. PITCHER ST., KALAMAZOO 13, MICH.



SMALL-PARTS MACHINING











The new "American" V-Eight Wheel takes heavy cuts and holds its corners — is an excellent performer in dish and cup shapes. Its structure gives maximum air cooling for dry grinding . . . carries extra coolant when wet grinding. The V-Eight removes more metal in less time and gives long, efficient service both on production jobs and in the tool room.

Write for information.

#### AMERICAN EMERY WHEEL WORKS

PETABLISHED TREE

7 Richmond Square

Providence 1, R. I.

### **When Production Planning Sheet**

## federal areas

Full description of the Federal Rocker Arm type of welders is in this Bulletin 4610, available on request.



Further scope in spot and projection welding is described in this Bulletin 4620. Ask for your copy.



Federal Rocker-Arm Spot Welder permanently fastening clips and fittings to component for final assembly. Jigs like this are widely used to speed handing of small welded parts.

#### Federal Welders Raise Standards of Metal Fabrication...in Small Shop or Large Plant...

The business of making things from metal has come a long way since the days when everything from rainspouts to refrigerator liners was roll-seamed and soldered, not too many at a time, by craftsmen known (with all due respect) as "Tin Knockers". Today Federal Spot Welders play a big role in making Metal Fabricators out of such craftsmen.

In the smallest shops...the largest plant...Federal Spot Welders are speeding and improving fabrication of tremendous tonnages of metal. Variety of production is from small "tack on" jobs, accomplished with amazing speed, to assembly of full-size cabinets, lockers, boxes or what have you. Cuts in costs and "ups" in production are the rewards in each application. Try it on YOUR fabrication.

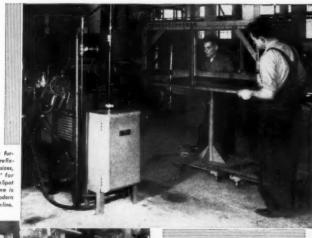




Sommer and Adams. Co. Cleveland SPECIAL HIGH PRECISION MACHINES
The Waven City Mfg. Co. Marcan. WARCO PRESSES and PRESS BRAKES

MACHINE

### Metal Goods—REMEMBER...



Freeze boxes or furnoces, stoves or store fixtures, all types, all sizes, are "duck soup" for Federal Rocker Arm Spat Welders. This one is part of a very modern welding production line.



A simple special lower electrode fixture aids location of spots in this small fabrication. Mochine is one of a line of Federals in a large scale "job" shop with a reputation for making "anything" from sheet metal.

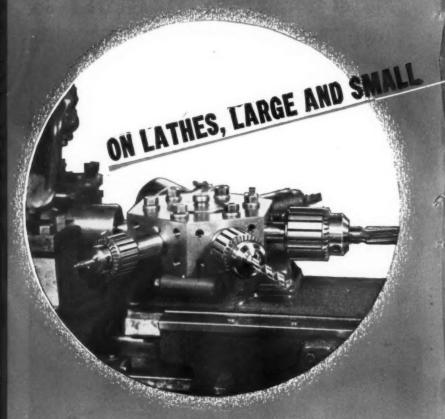


Another production line application of Federal Rocker Arm Spet Welders, where speed and consistent performance are impertant.

#### AND WELDER COMPANY



216 DANA STREET . WARREN, OHIO



"IF IT'S A JACOBS, IT HOLDS"

Gacobs

\*\* the majority choice is

Jacobs Chucks

he manufacturing routine of many a thriving metal working plant is built around lathe production. And because Jacobs Chucks link lathe power, speed and accuracy with the work it produces, Jacobs is the choice again and again. Jacobs performance is built on many small, vital details that add up to the world's best drill chuck ...

Nickel alloy steels for strength and to wear carefully surface hardened - Lands are heat treated for extreme hardness but with adequate core strength retained— Gub sleedes are simultaneously droing internally on three dimensions for balance Tools can be readily changed and are always accurately centered with a same drib-Winnte foles ances bermit ready interchangeapility. In apob or brodnet wake lacops Chucke Aont first choice - pecaree if

it's a Jacobs, it holds!"



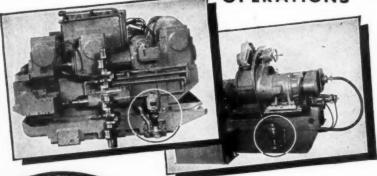
**JACOBS Ball Bearing** SUPER CHUCK

Mucks

THE JACOBS MANUFACTURING COMPANY

## SPEED CUTTING

## OPERATIONS



OLLOW THE LEADERS "GUSHER"



## RUTHMAN GUSHER

To speed production on metal cutting operations, these leading manufacturers of machine tools turn to Ruthman Gusher Coolant Pumps.

Illustrated above left is a "MELLING" TYPE CRANK-SHAFT CONTOUR TURNING LATHE, made by the Crankshaft Machine Company. It is equipped with a ¼ H.P. MODEL SLO-7230 RUTHMAN GUSHER COOLANT PUMP. At the right is a SPECIAL "GARDNER" DOUBLE SPINDLE GRINDER with a ¼ H.P. MODEL 11022 SHORT GUSHER COOLANT PUMP.

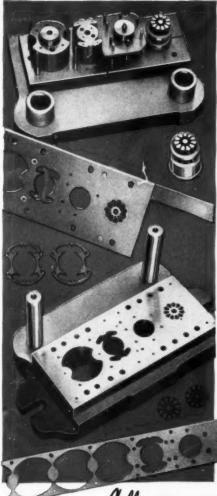
Satisfied customers are your best guarantee of the service a "GUSHER" will give you. Always specify them on your machines.

WRITE FOR CATALOG 10G.



1823 READING ROAD

CINCINNATI, OHIO



## This BLUE CHIP High Speed Steel Die

Lives Up to its Name!

- produces 75,000 pieces per grind
- has a life of 8,000,000 pieces
- furnishes blanks free from burrs

The remarkable performance records being made by this Blue Chip Blanking Die for motor laminations are typical of Firth-Sterling quality and precision. What is your die problem?



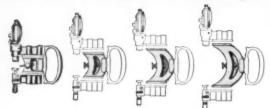
Stock Steeling

MICRESPORT, PA. - NEW YORK - HARTFORD - PHILADELPHIA - PITTSBURGH - CLEVELAND - DAYTON - DITROIT - CHICAGO - LOS ANGELES

### FOUR GAGES IN ONE



#### One Pair of Heads, Four Extension Spacers, Cover 4" Range

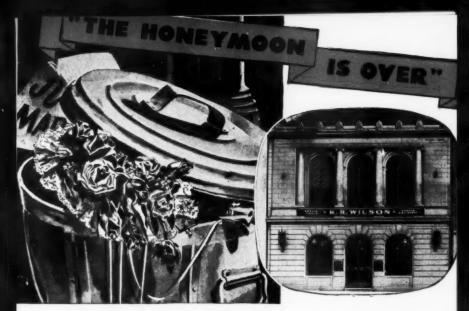


SET, consisting of a pair of heads and four interchangeable extension spacers, effects marked saving in cost. Sets available for either 0 to 4" or 4" to 8" range.

Full Size Decimatic Indicator Easily Set to Blocks or Master

**Tungsten Carbide Gaging Surfaces** Highly Consistent Repeatability Graduated in "Tenths"-Accurate to "Split-Tenths"

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



• The realization of this fact has apparently been quite a shock to a lot of salesmen and manufacturers who have been riding through the "tupnel of love" these past few years... totally oblivious to the idea that it couldn't last forever. This "writing on the wall" has been clearly visible for many months now, but apparently, many people can't read, or if they can, refuse to believe what they see.

For our part, we welcome the change. We're glad we have to SELL our products... not just make them, crate them and set them on the loading docks. We welcome the return of the good old 100% American competitive method of getting business. If you don't believe it has returned, then watch out, because it will have, before you can throw your hat out of the window.

#### COME IN WHEN YOU'RE IN BUFFALO

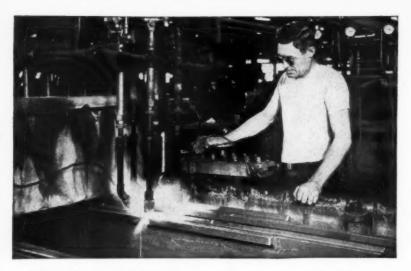
... the City of Good Neighbors

Just as soon as American ostriches... both labor and management... get their heads up out of the sand and go to WORK, just that soon will we all GO PLACES. Then, and only then, will America be able to produce the internal peace and prosperity she is capable of delivering.

## K. R. WILSON

215 MAIN STREET, BUFFALO 3, N. Y.

Manufacturers of Hydraulic Bionking, Stemping and Forming Presses... Hydraulic, Electric and Air-operated Arbor Presses... Hydraulic Brakes... Die Try-out Presses... Stretching, Presses... Complete Automotive Service Equipment... Industrial Power Units.



## This Flame Hardening Keeps Monarch Lathe Ways "Good as New"—EVEN AFTER 1,090,000 CYCLES

"... This fine tool was used in shell manufacture and during its time in use, approximately one year, turned the burr ring on one million, ninety thousand shells. In examination of the machine, we find the ways as good as new although the movement of the carriage was confined to a short space. This seemed amazing to us after our experience with the older types of construction."

That's unsolicited, written testimony about a standard Monarch 10" EE Toolmaker's Lathe. What wasn't known is that such performance records are the accepted. rather than amazing, experience—for thousands of Monarch users everywhere.

More than 21,000 lathes have left our plant with flame-hardened ways since we first introduced the process for machine tool applications, back in 1937. It's one of the many plus features of Monarch Lathes—features that enable you to produce more for less. We'd welcome the opportunity to show you how Monarch can meet your metal-turning needs. May we talk it over?



THE MONARCH MACHINE TOOL COMPANY . SIDNEY, OHIO

## OLIVER TOOLROOM

#### USE THE OLIVER DIE MAKING MACHINE IN YOUR OWN PLANT





Extremely fast on sawing, filing and lapping operations. Eliminates drilling and chipping.

The Oliver of Adrian Die Making Machine cuts direct labor cost 50% to 60% in making dies, gages, templates and cams. Does not require skilled mechanics to operate.

ABOVE—The bench type efficient die making machine with  $8\frac{1}{2}$ " throat which permits sawing to center of 17" circle. Tool steel up to 1" thick can be sawed and filed. The 10" square table tilts 10° right, left and forward.

LEFT.—HEAVY DUTY. This machine will saw and file metals up to 3" thick. Sawing can be handled up to 20" circle. 100 to 300 strokes. The 14" square table tilts 15° to front, left or right and 3° to back. Constant controlled pressure feed. NO WORK SPOILAGE.

## IMPROVE YOUR TOOLROOM IT'S THE BACKBONE OF PRODUCTION

#### OLIVER INSTRUMENT CO.

1408 E. MAUMEE ST.

ADRIAN, MICH.



AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL
POINT THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DIEMAKING MACHINES

More Speed...

LONGER DRILL LIFE
with CONTINENTAL'S

New DRILL CHIP
BREAKER

Faster drilling action and prolonged tool life are but two of many advantages obtained with the Continental Drill Chip Breaker. By breaking chips into small, uniform pieces that are easily carried up the flutes of the drill, clogging is eliminated. The unit can be used vertically, horizontally, or at any angle as long as the housing can be kept stationary while the drill rotates. The arm prevents rotation of the housing. Where space permits, the Continental Drill Chip Breaker can be used in multiple spindle heads. Write for Continental Bulletin 28161 for sizes, complete specifications and 7 ways to profit by this new Continental product.



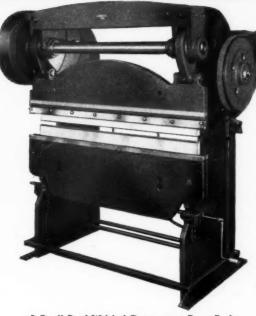
With the Continental Drill Chip Breaker, the chip is broken at regular intervals. Small loose chips are easily carried up the flutes. Holes are straighter, rounder, and have better wall finish.

46--5

#### CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION
1200 OAKMAN BOULEVARD • DETROIT 6, MICHIGAN

# Towerful CAGO CHICAGO STEEL PRESS BRAKE



TYPE → "300"

A POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

Can handle 40 to 50 percent of the work done in the average plant, thereby releasing the larger Presses for heavier work. Can be used for Forming Embossing-Multiple Punching, Notching, Blanking, etc.

Easy of operation, accurate and constructed of highest quality material and backed by over 45 years experience building Steel Press Brakes and Bending Brakes.

World's largest manufacturer of Steel Hand Bending, Power Bending and Power Press Brakes.

A dependable variable speed drive much desired by all users is standard.

A Small Steel Welded Construction Press Brake a brute for punishment and a prodigious worker for the Sheet Metal Plant—

-3 sizes—capacities 10 gage, 4 ft. long; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by  $1\frac{1}{2}$  h. p. motor,

DREIS & KRUMP MANUFACTURING CO. 7440 LOOMIS BLVD. . . CHICAGO 36, ILLINOIS

## THE DRILL WITH A HUNDRED AND ONE SPEEDS

4 SPINDLE M96
RIGHT HAND
SPINDLE
POWER FEED

ALL SPEEDS
INSTANTLY
AVAILABLE
WHILE MACHINE

IS RUNNING

TWO MODELS

M96-% CAP. M125-% CAP. BOTH PRECISION BALL BEARING



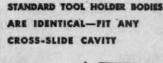
SEND FOR CIRCULAR

THE TAYLOR & FENN CO. HARTFORD 1, CONN.





Pictures above show the location and ar-rangement of cross-slides on frost and back of the GREENLEE "6". Arrows indicate the position and accessibility of identical











INTERCHANGEABLE. All cross-slide tool cavities on the GREENLEE "6" are identical, and the bodies of all cross-slide tool holders are made to fit these cavities accurately. Tool holders may be used in any cavity and can be quickly and easily shifted from one position to another or from one machine to another.

TIME SAVING. This interchangeability of tool holders saves a substantial amount of time on set-ups because there is no hunting

around for special holders to fit certain positions and because tools coming off a job can often be quickly rearranged for the new job. Futhermore, fewer tool holders will be required, with a noticeable saving in tooling expense.

OTHER FEATURES. Get our new book "Greenlee Automatic Screw Machine" and read about the many other outstanding features that make this machine "The Operator's Favorite."





GREENLEE BROS. & CO. 1832 MASON AVE., ROCKFORD, ILLINOIS

WRITE TODAY FOR MORE FACTS

MULTIPLE SPINOLE ORIGING, SURING, TEPPING MACHINES . AUTOMATIC SCREW MACHINES . PUTDMATIC TRANSFER PROCESSING MACHINES





# PRODUCED THIS TOOL with RADIAL FORM RELIEF FROM A SCRAP DRILL



This roughing tool was needed to drill and counterbore cavities in forging dies in one operation. The tool was needed in a hurry and D-S produced it with radial form relief from a scrap 2" twist drill. The material cut was hard and tough and presented a problem, yet the cutter delivered a highly satisfactory job.

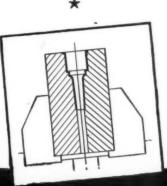
#### THE CUTTER

Radii brought up to cutting edge. Sharp corners, no undercuts. Circular land left on diameters.

WRITE FOR YOUR D-S CATALOG Today!

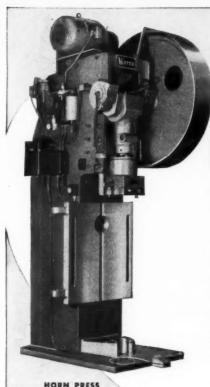
#### THE WORK

Two blocks held in chuck. Columbia Formite: .40 carbon, 3.75 chromium, 14.50 tungsten, .65 vanadium.



D-S GRINDER DIVISION

ROYAL OAK TOOL & MACHINE CO. 625 E. 4th ST. ROYAL OAK, MICH.



# Warco PRESSES WELDED STEEL CONSTRUCTION

Weldments Fully Stress-Relieved

#### **Workmasters for Your Production Line**

Rigidity, strength, accuracy, power and endurance are carefully engineered into Warco presses to make them work-masters on your production line. Warco's complete engineering service and exceptionally large factory facilities are available to give you prompt delivery. Your inquiry or order will receive immediate attention. Arrange to visit our plant and see how Warco presses are built.

#### A full line of

2-Point Eccentric Gear Presses
Straight-Sided Hydraulic Presses
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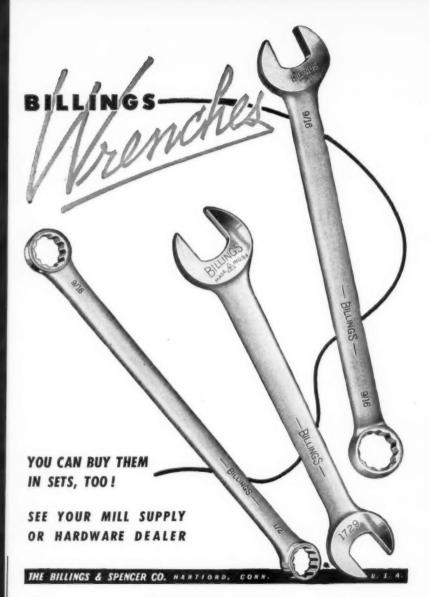
#### HORN PRESS

Capacity range, 50 to 200 tons, stroke range, 4 to 14 inches; especially suited for all horning and wiring operations. Single-geared, electrically controlled. Friction clutch and brake unit.

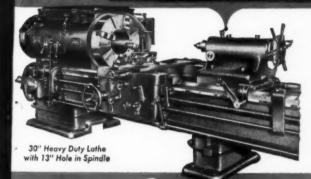
#### WARREN CITY MANUFACTURING COMPANY

1948 Griswold Street . Warren, Ohio

A Subsidiary of The Federal Machine and Welder Company
Offices in Principal Cities



# **Hydratrol Lathe!**



#### 5 sizes-18"to 36"

Small, 18" up to 7-1/8" Hole Medium, 24" up to 12-1/8" Hole Large, 27" up to 13-1/8" Hole Large, 30" up to 14-1/8" Hole Large, 36" up to 16-1/2" Hole

(Standard Type)

DO IT FASTER \* DO IT MORE EASILY IT MORE ACCURATELY IT MORE ECONOMICALLY



Standard Type, Heavy Duty HYDRATROL LATHES, 20" to 36"

The big 27" size, shown above, has all the ruggedness and power for the heaviest possible work. And its many refinements in design and construction result in an ease of operation comparable to small machines.

Precision - Speed - Endurance Long Life- Absence of Mochanical Troubles!

# *jehmann* E COMPA

CHOUTEAU AT GRAND - ST LOUIS 3.



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#### STANDARD MACHINERY COMPANY

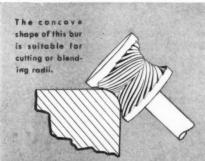
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## The Right BUR for the Job

# Shape "Z" KELLER BUR

The concave shape of this bur is designed to cut or break corners where a radius or contour is needed, as shown in the illustration below. It is also suitable for cutting or blending wherever sharp edges are to be broken down or rounded off. Like all KELLER Burs it handles a diversity of work in the tool shop. P&W KELLER Burs are long-lasting, smooth-running and economical. Write for circular on other shapes and sizes of P&W KELLER Burs.



Shape "Z" is available in 4", 34" and



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PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

# MATCHED FOR THE JOB!

PLAIN TYPE





UNIVERSAL TYPE

In Sixes from 16" to 36" inc.

"Lubrigard" Safety Device Increases the Precision Life

GENERAL ENGINEERING & MFG. CO., St. Louis 16, Mo.

# ELECTRONIC OIL MIST AND SMOKE COLLECTOR

ELECTRO-MIST COLLECTOR

Completely self-contained—the Electro-Mist collects oil mist and smoke created by high speed cutting and grinding operations where coolants are employed.

Mist and smoke-laden air first passes through a filter removing metallic dust and large droplets of oil. It then enters ionizing unit where a positive charge is given each tiny particle of mist and smoke which are precipitated on grounded plates of opposite polarity. Air may be returned safely to work room.

Compact in design . . . Efficiently exhausts oil mist and smoke at its source, eliminating all hazards.

Unit is completely demountable—all parts removable without tools for cleaning. Complete information given in Bulletin No. 251. Send for it.

AMERICAN AIR FILTER COMPANY, Inc.
Incorporated
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In Canada: Darling Bros., Ltd., Montreal, P. Q.



# The Leader in it's field

MODERN SELF-OPENING STUD SETTERS

Used by practically every automobile, truck, tractor, diesel engine manufacturer and others with studs to set in quantity.

The three simple MODERN steps to speed, economy, and convenience in stud setting are illustrated at the right.

At the top . . . jaws open to take

the stud.

Middle . . . driving position, jaws locked on stud.

At the bottom . . . stud driven to full depth. The stop collar contacts the work and releases the clutch. Lifting the tool opens the jaws.

The tool revolves in one direction, no reversal, for the complete job.

Tool brought to position

Start of the drive, wit tool engaged on the stud.



Drive completed, with clutch released.



As the action of the tool is positive and automatic, it can be operated in any position with either air or electrically operated portable tools. It can also be used in a drill press, where it is possible to drill and tap the holes and set the studs in successive operations.

Write for detailed information on the Modern Stud Setter. You will be interested in how and why it provides a proved means for stepping up your production.

### MODERN TOOL WORKS

CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK



DRILL CHUCK

"This modern ALCO Drill Chuck has made it possible for us to meet some of the toughest production schedules we ever had to face.

"When we equipped our screw machine department with ALCO Holders, it was the smartest move we ever made, and one of the biggest savings was in eliminating our bushing inventory; because these ALCO Holders have a tight grip without using bushings. "We only need a comparatively few of these tools to do all our work for we use the same ALCO Chuck to hold drills, counter bores, reamers and spotters.

"One thing which makes these tools outstanding is the adjustment for concentric drilling or reaming. Even on our old machines, we turn out perfect work and have no rejects because of this concentricity."

Write for new catalog No. 6

## ALCCFTOOLS

THE ALCO TOOL CO. 252 Birdseye St., Bridgeport, Conn.



Ior a number of very good reasons. In the first place
these saws, though rugged in design and
construction, are compact, self-contained, and
readily portable. You can move them to a point
most convenient to the work. They take up
little floor space. Wells saws are also 100%
practical—simple to operate, yet capable of handling a wide variety of work without special
fixtures. A third important reason for widespread
popularity, is that thousands of users have found them
highly profitable. For a small investment, you get a
versatile tool that can help you in many ways...in
breaking bottlenecks...in getting work out in less time.
See your local Wells distributor, or write for details.

Wells

WEIGHT:

SPEEDS: Selective 60, 90,

Approximately 665 lbs.

130 feet per minute

Products by Wells are Practical

## METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 707 COOLIDGE AVENUE, THREE RIVERS, MICHIGAN

## Sharpen SPIRAL POINT TAPS

## Accurately AND Quickly WITH THE

# NEW BLAKE FLUTE GRINDER



No longer do you havé to scrap spiral point taps for want of an accurate and speedy method of renewing their dull cutting edges. The Blake Flute Grinder—the only complete spiral point tap grinder on the market—provides the positive, mechanical controls which reduce the entire sharpening operation to a very few simple, safe, and quickly performed movements.

Spiral point taps—kept sharp on the Blake Flute Grinder—can be ground down to the last two or three threads and still cut to size. You'll increase tap life ten times and more ... cut tens of thousands more threaded holes per tap ... greatly decrease your tap costs and spoilage due to imperfect threads.

The straight flutes of any kind of tap can be ground just as readily . . . likewise drills, countersinks, and many other straight- and angular-fluted tools.

We've prepared an illustrated booklet that gives complete details of this unique machine. A copy is yours for the asking. Use the coupon below.

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COMPANY\_\_\_\_\_STREET\_\_\_\_

# EDWARD BLAKE CO. 634 COMMONWEALTH AVE. NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS



## INSIST ON Kaskins

In the flexible shaft line durability counts—and Haskins Flexible Shaft Machines are durable.

These portable tools will stand continuous hour after hour use—three shifts a day—seven days a week. They'll turn out more work—better work—faster and easier, with longer trouble-free operation. For grinding, sanding, rotary filing, wire brushing, buffing or polishing—use Haskins machines—use them hard. They won't let you down! Send for details.

#### DURABILITY

NS-7

N.P. Multi-speed countershoft unit. 975 to 3100 RPM. Three wheel heavy duty truck. 360° molor swirel.

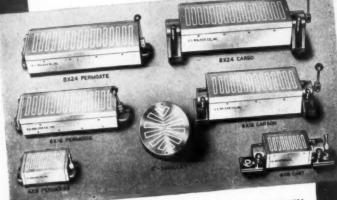


R. G. HASKINS COMPANY

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FLEXIBLE SHAFT EQUIPMENT

# Walker Chucks



# THIS IS THE WALKER PERMANENT CHUCK FAMILY!

Truly a credit to the O. S. Walker Co., Inc.

Over 60 years of chuck building, design, and engineering experience is incorporated into these PERMOS.

WALKER ENGINEERS invite you to present your problems for solution at no obligation.

REMEMBER there is a WALKER CHUCK for every known application.

### O. S. WALKER COMPANY

MAGNETIC CHUCKS . GRINDING MACHINES

WORCESTER & MASSACHUSETTS

# SPEED YOUR PRODUCTION WITH NEW METAL

SawMore

CUTTING EQUIPMENT

War production demanded and got the utmost from machines. That means, if yours is the average shop, more than likely the war years have made your metal cutting equipment ready for replacement.

In precision metal cutting where highest metal cutting standards are demanded, Sawmore machines assure you of topmost speed — economy — and absolute cutting accuracy. Yes, Sawmore puts profits in your production.

Sawmore Metal Cutting Machines give you:

- Four cutting speeds—65, 93, 120, 149 strokes per minute.
- Self-aligning blades.
- Automatic feeding that cuts more metal in less time.

- Swiveling of machine to give angular cuts without moving stock.
- Gears in constant mesh reduce backlash to minimum.
- Transmission housed in oil tight case.

Write today for literature, prices, and detailed specifications.

IMMEDIATE DELIVERY



MAQUOKETA, IOWA

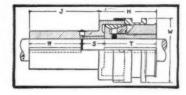
A HANSON clutch
HAS SOMETHING TOO!



This type M is but one of HANSON'S many industrial type, dependable friction clutches.

It is entirely cylindrical, perfectly balanced and has practically no speed limitations. Its few moving parts may be easily replaced when worn. It can be adjusted to absolute uniformity by any unskilled workman. A single adjusting nut does the trick.

Type M comes in both single and double units. Install them now. Then you'll see why we say that "A HANSON Clutch HAS something!"



For complete specifications send for catalog B-126.

Hanson Clutch & Machinery Co.
TIFFIN, OHIO

# HANSON Friction Clutches

for every clutch requirement, regardless of load or drive speed.



### COUNT 10

### for a Sure bet in Bandsaws

Here are ten main features to help you judge how well the Johnson bandsaw can serve you . . .

- 1. Large Capacity: 10" High x 18" Wide. Cuts small and large diameter stock - smoothly, evenly.
- 2. Three Point Base: Firm anchorage always assured. Bed cannot absorb strains caused by uneven floors. Twistproof.
- 3. Rigid Box-Type Frame: No wearing through friction. Oversize bearings and shafts throughout. Blade tension is uniform. Guides are wide - stay adjusted.
- 4. Bed is Wide and Deep: Accurately machined all component parts work from common machined surface. Upper frame moves on large pivot bar through bed.
- 5. Quick Acting Vise: A time saver takes a moment to lock workpiece in place.
- 6. Hydraulically Controlled: Frame descends gently on oil cushion. Hydraulically stopped at any height.
- 7. Four Speeds: 35, 90, 130, 190 teet per minute. You are sure of the correct speed for best results and fastest production.
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- 9. Long Blade: 11' 5" long. Never heats. Most economical length to buy.
- 10. Portable: Self-contained. Plug in anywhere. Casters available.

available

Wet attachment

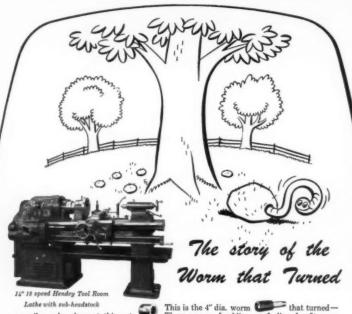


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## JOHNSON MANUFACTURING CORP.

616 Chrysler Bldg.

New York 17, N. Y.



Lethe with sub-headatock

o easily—when he met this nut

There was no fumbling, or feeling for fit, even though each had eight starts—even though tolerances were extremely close. This should have been a difficult manufacturing problem, but it wasn't—the worm and the nut were both produced on a Hendey Precision Tool Room Lathe with sub-headstock—produced the accurate Hendey way—achieving results that are easily explained when you study the design and construction of a Hendey Lathe. Design is functional—controls simple, strategically placed, lubrication of important units automatic. Construction specifications call for oil-hardened, shaved gears in headstock, super-precision bearings which completely eliminate chatter, standard commercial lead screw accurate to .001", close-grained special alloy lathe bed, testing of every part, assembly and finished machine—details that mean every Hendey Precision Tool Room Lathe will produce precisely for years—reasons why experienced machinists wear by Hendey.

Write today for complete details on the machine that made the worm turn-so easily.

The Hendey Machine Company



Main Office and Plant - Torrington, Connecticut

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SHAPERS



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The higher cost of man-hours demands an increase in output of usable material. The price you pay — your actual total expense on metal cutting work is governed by two factors — the productivity of your equipment and the quality of the finished cuts.

Racine metal cutting Machines incorporate modern hydraulic feed and control. They cut faster because the blade is correctly applied by Racine's exclusive progressive feed throughout the cutting stroke. This scientifically correct feed also insures accurate cuts. No unnecessary turning or milling of excess stock in subsequent machining operations.

For nearly forty years, Racine engineers have specialized in metal cutting problems. Get the facts on the productive capacity of Racine Machines; available in all sizes from 6" x 6" to 20" x 20". Free catalog No. 12 includes a quick, easy to read description of all models. Write for it today Also include a brief outline of your metal cutting work.



#### RACINE OIL HYDRAULIC PUMPS AND VALVES

Use Racine Variable Volume Pumps, Valves and Controls for smooth oilcushioned power movements. Pump capacities to 30 G.P.M., pressure to 1000 lbs. p.s.i. Valves to 1½" I.P.S. Ask for catalog P-10-C.

RACINE TOOL AND MACHINE COMPANY, 1755 State Street, Recipe, Wisconsin



RACINE

STANDARD FOR QUALITY AND PRECISION

# PRODUCTO HAND TAPPERS

The one machine needed in every tool, die and machine shop. Will save its cost many times over. Designed for toolroom work to close limits. Built to withstand hard shop use. Quickly adjustable to position taps at any place on table. Now





made in 3 sizes... 2 bench types, capacities 1/4" and 1/2" taps; and Universal Pedestal type, capacity 1" taps. Once in your shop, you will never be without it. Write for descriptive bulletin.

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# PRECISION

Long Life Precision is built into every Heavy Duty Marveco Live Center . . . They're built to do your job Better—Longer!

Built to such mechanical perfection, there is a Marveco Live Center for every turning operation.

The Marveco is guaranteed to outperform and outlast any other Live Center.

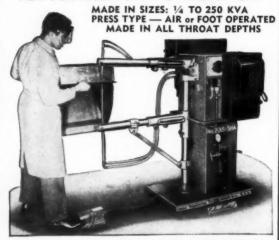
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WE MAKE ALL TYPES OF TRANSFORMERS SIZES FROM 1/4 TO 250 KVA OIL COOLED TYPE

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FOOT, AIR
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Product of more than 50 years of specialization in the manufacture of band sawing machinery the TANNEWITZ 24M is the machine that will enable you to capitalize to the

DI-SAW

fullest extent on the economies of contour sawing, inside and outside filing and polishing. It's rugged, with every detail of construction thoroughly proved, — TROUBLE-FREE. And it carries full 24-inch wheels which make for easier, straighter sawing. For complete details write for DI-SAW Bulletin.

FRICTION SAWING with Tannewitz High Speed Band Saws offers many amazing advantages. Write for free booklet.

THE TANNEWITZ WORKS
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Di-Acro Shear squares and sizes material, cuts strips, makes alits or notches, trims duplicated stampings. Shearing width—Shear No. 1—6'. Shear No. 2—9'. Shear No. 3—12'.

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Di-Acro Brake forms non-stock angles, channels or "Vees." Right or left hand operation. Folding widths: Brake No. 1—6". Brake No.2—12". Brake No. 3—18".

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Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity—Bender No. 1—1/2" round cold rolled steel bar. Bender No. 2 and No. 3—1/2" cold rolled steel bar.

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It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.

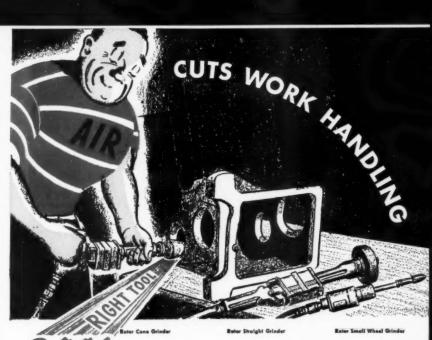




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## BRINGS YOU THESE IMPORTANT SAVINGS



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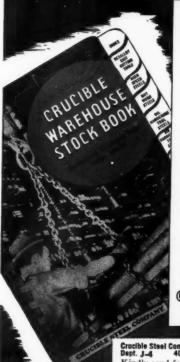
 $\star$  Hoffman Filtration increases production, lengthens life of machines, cutting tools and grinding wheels. One plant reports amortization of filter in 3 months.



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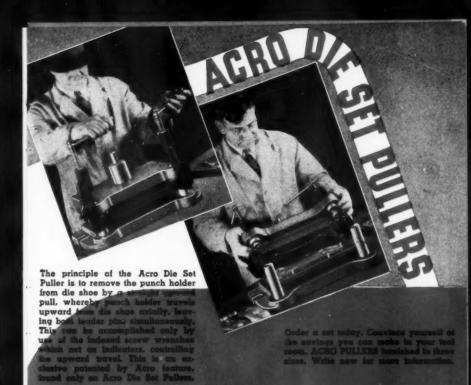
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There is no drippage, no waste, no over low. Oil is automatically ied to the bearings as required.

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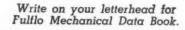


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Your starting point is the "Basic Unit" of the heavy duty Minneapolis Production Lathe. To it you can add exactly the accessories needed for your specific production job,—any drive, any collet, mandril or chuck, or any cross-slide, carriage or turret. By ordering only as many accessories as you need—you have a Lathe "tailor-made" for your present work at a minimum investment. Additional equipment can be added as needed, including specially designed jigs or attachments as desired.

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Plain Callet
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Callet with Pads
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Manual or Air Operation of Collet or Mandril

Any CHUCK, air or hand operated

ANY ACCESSORY



CROSS-SLIDE Hand



CROSS-SLIDE: Rack and pinion feed

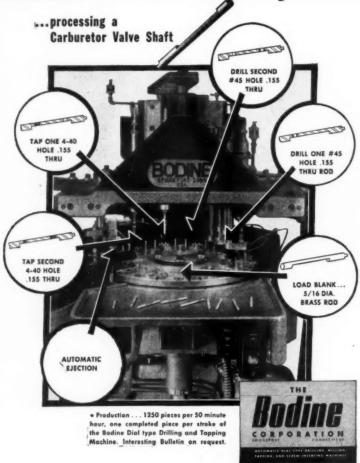


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# **Boding**...Case History Nº 16





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A. O. Smith's new plant at Kankakee will have the largest radiant heating plant on record. Water, heated to 140 deg. by 120 separate heaters will circulate through 40 miles of pipe laid in the floor slab.

get ready with CUNE for tomorrow

The making of acetylene from natural gas is being studied and reports may be expected from the Department of Commerce.

got ready with CONE for tomorrow

Muncie Gear Works proposes to market a "reverse cycle" heating plant this year.

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Truck bodies of magnesium are being made by Barry and Bailey Co. of Philadelphia.

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Blue Mountain Clay Co. of Memphis makes a new oil, grease and water absorbent for oily and wet floors that is said to absorb 120% to 140% of its weight.

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The Public Health Service announces that satisfactory substitutes for mercury have been found that end the hazard of mercury poisoning (the origin of the term "mad hatter") in the hat making industry.

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In a new thickness gage, designed by Glenn L. Martin Co, a dial registers the deflection of a sheet of metal when a predetermined vacuum is created on one side of it.

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The idea of the variable pitch propeller has been applied to industrial fans by Evans Products Co. Operated by a built-in thermostat, it maintains constant engine operating temperature.

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An electrically conductive, nonsparking linoleum has been introduced by Congoleum-Naira. General Electric has patented a new type of household refrigerator which maintains temperature at two levels simultaneously.

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The Bureau of Mines has recently released information on its process for the electrolytic method of producing manganese.

Pullman-Standard has increased its output of car wheels ten times by using a machine which revolves the tool instead of the wheel.

get ready with CONE for temorrow

National Tube Co. claims that its new plant at Lorain, Ohio, is the world's first straight-line seamless pipe mill. It produces 2,000 feet of seamless steel pipe per minute. The Office of Technical Services of the U. S. Dept. of Commerce reports on a silver-magnesium solder that can withstand the heat of gas turbines.

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"Multi-tule", a profile blade type form tool holder, is to be made available to users of a well-known make of multi-spindle automatic lathes. The holder is particularly adaptable to short runs and cuts down time in tooling change-overs. It reduces the number of holders ordinarily required for a number of iobs.

set ready with CONE for tomorrow

Dr. Baetjer, of Johns Hopkins University, prophesies that by 1950 one in every three women over fourteen will be employed in industry.

get ready with CONE for tomorrow

The USS Salem and USS Newport News, now being built, will be the first ships in what is promised to be a completely air-conditioned Navy.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION



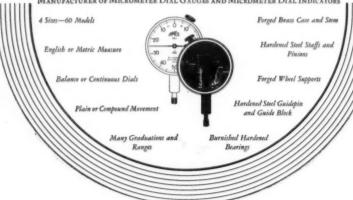


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For tool checking or tough production jobs, Ames Dial Indicators are *time*-conserving as well as sensitive and accurate. They're *quickly* mounted and adjusted. Their dials are *instantly* readable. But *most time-saving* is their ability to stay *right* on the job, without internal adjustment—*longer* than any other indicator, you can buy. Send for illustrated Catalogue.

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your requirements for a superior blade on complicated die and fixture radius cutting. ATLANTIC specializes in accurate milled and precision set teeth, hardened to exact temper.



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Safety Friction Tapping Chucks; Quick Change and Positive Drive Drill Chucks; Vertical Float Tapping Chucks; Parallel Floating Tool Holders; Power Bits for Phillips, Stotted Head and Clutch Head Screws; Hand Drivers for Phillips and Clutch Head Screws; Aircraft and Industrial Universal Joints; Sockets and Universal Joint Socket Wrenches.



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HANDLES are marked plainly and are easy to grip and use.

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Color identifies plug instantly. Weight is reduced. Secure locking — no slipping. No marring or scratching of plugs as with metal collets.



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Rugged, solid Konnemetal Blade head strong Grade K6; clamped-in, advance able, tour cutting edges

Shank, clemp, and book-up plate are hest-treated steel.

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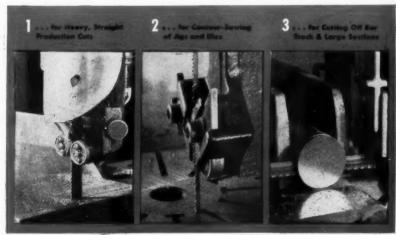
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238 FINDLAY ROAD

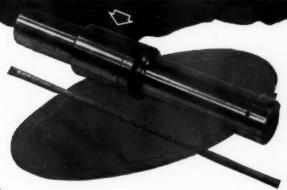
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Price (New) ..... \$7,054.00

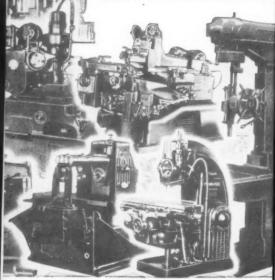
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Chucking Machine-Auto-matic, Vertical, Multiple

matic, Vertical, Multiple Spindle Type Chucking Machine—Single Spindle Automatic, Hori-zontal Turret Type Machine

Chucking Machine-Six Spindle Automatic. Horizontal

Drilling Machine or Drill Press-Bench or Floor,

Single or Multiple Spindle Gear Cutting Machine for Straight Bevel Gears, (Not

Planer Type)
Gear Hobber-Horizontal
Gear Hobber-Vertical,

Universal Gear Shaper-For External Spur Gears Only Gear Shaper—For Spur

Gears, External or Internal Gear Shaper-For Spur and Helical Gears, External and Internal

Gear Tooth Shaver-For External and Internal Gears

(Rotary Type Machine)
Gear Tooth Grinder—Generating Type, for Spur and
Helical Gears

Gear Tooth Grinder-For Spur Gears, External and Internal (Formed Wheel Type Machine)

Grinders-Centerless Grinder-Crank Pin Grinders

Grinders-Plain External Cylindrical Grinder Grinder-Internal, Cylindri-

cal, Automatic Sizing
Grinder—Internal Cylindrical (Hydraulic Feed
Machine)

Machine)
Grinder-Internal Cylindrical, Hydraulic Feed, for
Hole and Face Grinding
Grinder-Surface, Rotary
Table Type
Lathe-Multiple Tool, Not
Automatic, Manufacturing
Type Production Lathe
Milling Machine-Automatic, and Manufacturing
Type Industry Internal Comments and Manufacturing

matic and Manufacturing Knee Type Milling Machine—Plain Bed Type, Horizontal Spindle Machines

Machines
Milling Machine—Vertical,
Knee Type (Not Including
Bench Type)
Polishing and Buffing Machine—Vertical, Fixed Bed Type, Single
and Multiple Spindle
Tapping Machine—Vertical,
Single or Multiple Spindle
Thread Grinding Machines
Thread Milling Machines
Turret Lathe—Ram Type,
Plain and Universal

### BELOWMARKE

#### NEW "FIXED PRICE" POLICY ESTABLISHED ON 31 TYPES OF SURPLUS MACHINE TOOLS

Here is good news indeed for the man who is trying to purchase general purpose production tools for replacement, reconversion or new enterprises. Now you can go into any of War Assets 33 Regional Offices, any machine tool site sale in the United States, or any approved War Assets Administration dealer and buy at the same fixed price, everywhere, the tools in these 31 groups listed at the left. No waiting for complicated figuring of prices, checks against priorities or other delaying factors. The tools are available in such quantity that your purchase can be cleared on the spot, and immediate delivery arranged.

But even more important is the principle under which the new low prices have been set. As the scale at the right indicates each price takes into consideration your costs of rebuilding the tool to new condition, engineering, service, etc. It is set well below the current market price for similar equipment sold on a full service basis. The differential is approximately 25% below market-enough for men with tooling "know-how" to realize a neat "extra" profit and at the same time acquire modern machine tools.

Plan now to check at once the detailed price and specifications list-now available in every War Assets Administration office (machine tool sales division) and the offices of your approved W.A.A. machine tool dealers.

#### FOR DETAILED PRICE CATALOG-WRITE, WIRE OR PHONE:

- 1. Your Regular Machine Tool Dealer War Assets Administration has appointed more than 3,000 "approved" dealers throughout the U. S.
- 2. W.A.A. Machine Tool Sales Division In any of the 33 War Assets Administration Regional Offices listed below.

#### EXTRA PROFIT AREA

For Alert Buyers With Tooling"Know-How." You can completely rebuild the tool, meet ing and haulage costs and still save money.

686-1

Bacton - Charlette - Chicago - Cincinnati Cleveland - Dallas - Denver - Dairolt - Fart Worth - Holong - Houston - Jucksonvilla GOVERNMENT OWNED SURPLUS

Orleans . Hew York . Philadelphia . Portland, Ore. . Richmond St. Louis . Self Lote City . Sen Antonia W.A.A.'s NEW PRICING PRINCIPLE



DEPRECIATION BASED PRIMARILY ON TIME



OBSOLESCENCE PACTORS



COMPLETE



## PEACETIME PRODUCTION MEANS BACK TO COMPETITION!

and here are the tools that will give you the "edge" on

#### COMPETITION!

• Yes, peacetime production will have its problems, even as war production. Not the *same* problems, but just as tough. Competition will require tools that cut clean—fast—smooth—accurately.

You can depend upon MEYERS GENERATED CARBIDE-TIPPED FORM TOOLS to give you the "edge" on competition, by giving you more pieces per hourmore pieces between grinds—and a much smoother finish. On actual production runs, MEYERS GENERATED CARBIDE-TIPPED TOOLS have boosted production by more than 500%!







Send us your prints for quotation

MEYERS GENERATED

Carbide-Tipped

FORM TOOLS



#### W. F. MEYERS COMPANY

Established 1888

1012 FOURTEENTH STREET . BEDFORD, INDIANA

#### THOROBREDS!

CONWAY CLUTCHES are built for smooth running power . . . with sleek lines and perfect co-ordination . . . precision designed and built to render dependable performance and that "extra spurt" when called upon.



#### CONWAY CLUTCHES

For Efficient Power Transmission



#### STANDARDIZED INTERCHANGEABLE PARTS AND QUICKER DELIVERY

All this and instant stopping and sure starting, drag-free idling, large lever ratio, centripetal action and many other features.

> Illustrated is Conway Series 550 Overhead Release Disc Clutch

The CONWAY CLUTCH CO. 1541 QUEEN CITY AVENUE CINCINNATI 14. OHIO

## Benchmaster's\*Improved Model

#### 4-TON CAPACITY BENCH PUNCH PRESS



#### FOR STAMPING, MARKING, PUNCHING, RIVETING, FORMING AND OTHER HIGH-SPEED OPERATIONS

Light, compact and powerful, the improved, postwar Benchmaster 4-Ton Capacity Punch Press offers performance formerly found only in far larger models. Its unsual and exclusive features include a cradle base that allows the press to be inclined, a precision-ground shaft keyed by a press fit to a large eccentric to provide shockabsorbing bearing surface, bronze bushings at all wear points, a single trip action that may be made to repeat rapidly by removing a screw located in the collar, automatic knockout, an open back so that work may also be inserted from the front, a new-type floating motor mount which maintains proper tension of the V-belt, standardization of parts for quick, easy interchangeability and many other typical Benchmaster improvements.

For full information about this new Benchmaster Punch Press and other quality Benchmaster machine tools, write to Dept. MT-12

#### SPECIFICATIONS:

Weight, 215 lbs. Height, 27"
Die space, 5¾"
Center of bolster plate to frame, 3¾"
Bolster plate, 6" x 8" x 1" with 2" hole in center 285 strokes per minute with 1725 R.P.M. electric motor 1" stroke standard
Other strokes up to 2" special



MANUFACTURING COMPANY



#### With DARLY KOOL-KOTE Rotery Files

KOOL-KOTED FOR LONGER LIFE

CAN'T SCRATCH OR MAR

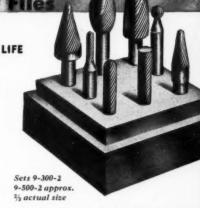
A SHAPE FOR EVERY JOB

Kool-Koting—a new process for toughening the surface of cutting tools, now enables Danly to offer Tool and Die Makers an amazing all-around tool for finish work in hardened die steel. Like no other tool ever offered, in performance, Danly Kool-Kote Rotary Files cut hours from the painstaking work of finishing on hardened tool and die steel.

The Kool-Kote process, a bombardment of electrolytic deposits on the full cutting surface of the tool, provides a tough outer surface highly resistant to abrasion. Kool-Koting increases tool life up to 500 percent—makes cutting possible on materials where no other like tool will perform.

The tools shown on this page are designed to fill every purpose in the tool and die shop—there is a shape for every job!

Every tool shown is ground in two finishes—30 teeth per inch for faster removal of stock before semi-finish work—50 teeth per inch for semi-finish work right up to final touch up. For smooth finishing work on dies, a special flute is ground continuing across radius—no ragged tooth ends to scratch or mar.



This special tool and die maker's set is ideal for milling out stock without costly machine setup, and other finishing work. These tools have \(\frac{1}{4}\)" shanks—ground 30 teeth per inch and 50 teeth per inch.

Especially useful for small close work in hardened tool and die steel, this set comes with \%" shanks, and is ground with 30 teeth per inch and 50 teeth per inch.

Tools can be ordered individually, or in sets. Many other sizes and tool shapes are available. Write for Rotary File Pamphlets which contain complete information.

Sets 9-300-1 9-500-1 approx. 2/3 actual size



#### TOOLS for PRECISION PRODUCTION



#### UNIVERSAL Precision TOOL HOLDER

Handles any and all lathe operations. Also for planer, shaper and special equipment.

#### **NEW EFFICIENCY FEATURES**

- Does the work of 10 different toolholders at a fraction of the cost.
- Locking Device has greater rigidity and positive locking. Can be locked in either right or left hand position.
- New Cam Design provides for increased rigidity of the tool bit. Retaining rings provide for easy removal of Cam for cleaning, oiling or replacement.
  - Bit and Holder are always parallel.
  - Quick change bit tightening device. (See "A".)
  - 100% interchangeability of parts.
  - High quality ground square Bit and Square Box Wrench furnished with each tool.

-	Holder	Bit	Holder
	No.	Size	Size
SIZES	00	1/4×21/2	%x 3/4x51/2 %x 3/4x51/2
31223	o o	1 x21/2	%x 3/4x51/2 1/2x1 1/4x61/8
-	2	*x31/2	%x1%x7

EXTRA LONG BITS and ROUND BORING BARS AND THREADING TOOLS are available for use in the same toolholder.

#### DRILL JIG BUSHINGS — A.S.A. Standard



a n d Treated.

FIXED RENEWABLE



RENEWABLE



LINERS



HEAD PRESS FIT



HEADLESS PRESS FIT



SIMPLIFIED ORDERING: Specify drill size, O. D., and length in order named. Also bushing number.

Bushings above 13/4" hole size will be quoted upon request. In ordering special bushings, forward blueprint showing all dimensions and limit.

These Drill Jig Bushings are made of high grade tool steel—Rockwell C 62 to 64 hardness.



HEAD TYPE LINERS

\*Special length bushings carried in stock in blank form.

PROMPT DELIVERY

Write for Literature



ACME TOOL COMPANY

96 WARREN STREET

NEW YORK 7, N. Y.



HAT old one about "... way to skin a cat" applies to many production problems, but all to often there is not more than one profitable solution. That's one reason for letting specialists like Sommer and Adams bring their know-how into your planning when you have a particularly rough one to skin.

Shown here are two examples of S & A "Productioneering" . . . applicable to a variety

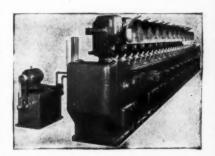
of special production problems.

The five station, multiple-spindle S & A machine above was designed to automatically drill, ream, counterbore, chamfer and tap large automotive parts at a high production rate. The number of stations, or the number of spindles YOUR machine might have would depend upon the needs developed by analysis of your problem.

The multiple head, horizontal polishing machine, with traveling fixtures (below) was the ONLY answer to another particular "faster-production-lower-cost" headache. Sommer and Adams lifetime of experience with special high

precision, high-production machinery can serve YOU if you will just let us make a Productioneering proposal on one of your out-ofthe-ordinary jobs.

NOTE: One of these mechines, with fixtures for polishing axe and herchet heads (two sides) at 300 per hour new available for immediate delivery.





Subsidiary of the FEDERAL MACHINE AND WELDER COMPANY
December, 1946

MACHINE TOOL BLUE BOOK



#### with the INTERCHANGEABLE HEAD

An important NEW development that enables ONE machine to do the work of many

No longer is it necessary to buy and set up individual machines for each individual tapping operation. By simply changing the head, every tapping job within its capacity can be handled with this ONE machine. It will tap out a single hole—or a dozen—in any pattern—provided the work is confined to a 10" x 12" area. Center distances, between spindles, can be held as close

as 1°. It will do the work with precision and accuracy. It will do it automatically—at high speed—with one operator in place of many. No expensive outlay for additional machines. No idle machines between jobs. Operator's time is utilized to the utmost. Floor space is conserved. Simple, dependable operation—with assurance of uniform, accurate work.

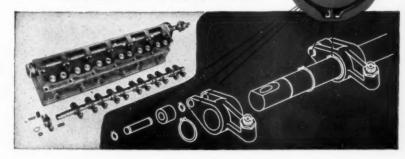
Write-at once-for descriptive folder.



Twin Coach uses Truarc Rings on new bus engine—reduces weight ratio to 1 hp. per 4.7 lb.

48 WALDES TRUARC RETAINING RINGS ON NEW ROCKER ARM

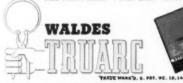
- Slash Labor Costs
- Guarantee Accuracy
- Cut Production Time
- Simplify Maintenance



"We've found Truarc a natural for automotive applications!" reports Twin Coach Company, of Kent, Ohio. Their new Fageol Twin Coach engine uses a total of 52 Waldes Truarc Retaining Rings—48 on rocker arm, 4 on water pump and oil pump drive—to develop the remarkable efficiency of 1 hp. per 4.7 lbs. (the average pre-war gasoline bus engine produced 1 hp. for each 9 lbs., diesel engine 1 hp. for each 10 lbs.)

Automotive designers are specifying Truarc rings in transmissions, clutches, brakes, and other vital assemblies. Production and maintenance men find that Truarc cuts costs sharply, is a superior solution to fastening problems because of its neverfailing grip, its patented design assuring constant circularity. Send us your drawings: Waldes Truarc engineers will be glad to show how Truarc can help you.

Visit Truarc Booth - Power Show - Grand Central Palace, New York - December 2-7



#### RETAINING RINGS

WALDES MONINGOR, INC., LONG ISLAND CITY 1, NEW YORK

Waldes Kohing Long Island C Please send Retaining Ring	ity 1, N. Y. Catalog No.	22-I
Name		
Title		
Company		
Address		
City	Zone	State

December, 1946

MACHINE TOOL BLUE BOOK

101

## INDEX VERTICAL MILLS

FOR THE TOOL ROOM OR PRODUCTION LINE

For use with end mills ½" to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.



#### 12" TOOL ROOM ROTARY TABLE



A quality teel for precision work in the toel room or production line, incorporating such features as hall bearings—bardened and ground worm—quick acting throw-out for free hand turning—aingle movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

#### INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

Write to Factory Sales and Distributing
Agents for complete information.

## BLANK & BUXTON MACHINERY CO.

3100 E. MICHIGAN AVE. JACKSON, MICHIGAN

# GRENBY HYDRAULIC GRINDING MACHINES

#### **FEATURES**

- Infinitely Variable Longitudinal Traverse
- Hydraulic Cross Feed
- Coolant
- Precision Spindles
- Heads Swivel For Angle Work
- Grinding Heads To Convert
   For Internal Grinding (See Cut)

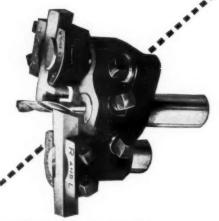
#### **EG103 SPECIFICATIONS**

Work Capacity—3" Dia. x 10" Length Workhead Accommodates—Collets 1" Max. Hole —Chucks & Face Plates 4" Max. Floor Space & Wt. 45" Long x 25 Wide—1600 lbs.

THE
GRENBY MANUFACTURING
COMPANY
PLAINVILLE, CONNECTIOUT



# RIGHT---



### --- LEFT in 10 Seconds...



Production savings are important in post-war work. Here is a tool that will save time and money in your shop.

R and L tools increase production by reducing set-up time, by speeding cutting operations, by doing right and left hand turning and by performing several operations simultaneously.

One R and L Turning Tool takes the place of an assortment of 14 separate tools costing 4 times as much! R and L are made in five different sizes . . . and delivery can be made from stock.

Let us send booklet describing R and L Tap and Die Holder, Roller Backrest and Universal Tool Post.

### RAND L TOOLS

1825 BRISTOL ST., NICETOWN, PHILADELPHIA 40, PA.



Pick-up position: Suction hose on intake at swivel connection—
Two way valve open—silde valve in—three way valve open to atmosphere,

Discharge position:
Pressure in tank—
hose on drain valve
—two way valve closed — slide valve
cut closing intake to
vacuum producer and
opening ports to allow air to be drawn
into vacuum producer
from outside — three
way valve closed delivering air into tank
under pressure.



# The Spencer SUMP-VAC Cleans Sumps in 2 to 10 Minutes

A Spencer vacuum producer mounted on a closed tank on wheels removes all liquid and sludge from sump tanks in two to ten minutes compared with half an hour with former methods. The rate of pick up is 40 gallons of liquid per minute.

The tank capacity is 125 gallons or enough for 3 to 5 average sumps. A filter basket collects chips and heavy sludge. A Neoprene float valve prevents overfilling of the machine. It is emptied by gravity in two minutes. By turning the valves provided with the machine and connecting the hose to the drain valve,

liquid can be discharged under approximately 3 lbs. pressure. This permits raising the liquid to a height of 6 ft., emptying the tank into a drum or other container for easy disposal.

No priming is necessary — and all material in the sump tank is cleaned out by air vacuum after the liquid is removed.

Sizes ¾ or 1½ horsepower, universal or single phase motors, 25 to 60 cycles, 110 or 220 volts or d.c.; 12½ foot vacuum hose lengths and 50 foot cable extension. Ask for the bulletin.

# SPENCER VACUUM CLEANING HE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.

## Use the COMBINATION DRILL TABLE and VISE



SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.

#### GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

#### FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

Circular on Request.



Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.

Jackson, Michigan

# MACHINE OF THE MONTH

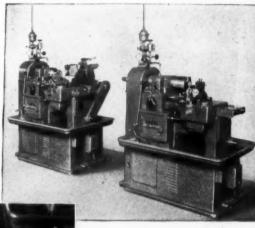
PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YOR

IMP LATHES

MACHINE
BRONZE DISCS

ON
2-OPERATION

SET-UP



Above: Close-up of first-operation machine.

Below: Close-up of second-operation machine.



Problem: To face, undercut, turn and groove bronze discs on a production basis.

Solution: Two Lo-swing IMP Lathes were selected for this job since the size of the work (2-5/16" dia. x 3/16") was within the eapacity of these high-speed machines. The first-operation IMP, seen at right above, locates the work from a previously-bored hole. An air-operated, compensating chuck grips it on the O D. Tools on the front cross slide face and undercut.

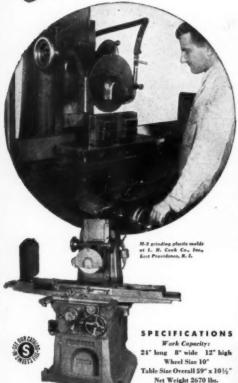
The second-operation IMP machines the reverse side of the part, again locating from the hole and driving with a compensating, internal jaw chuck. A tool on the front carriage turns the O D while tools on the back attachment face and groove. The facing tool relieves on the return stroke so as not to score the work.

Estimated production is 185 pieces per hour on the first-operation machine and 160 on the second—at 85% efficiency. All tools are cemented earlide.

LATHE NEWS from SENECA FALLS

# Plattic Mold Makers MI ABRASIVE M-3

MOTORIZED SPINDLE SURFACE GRINDER



### AND VERSATILITY ...

Extreme accuracy and fast production make the ABRASIVE M-3 a favorite with manufacturers of plastic molds. The dynamically balanced rotor, mounted directly on the grinding wheel spindle, gives unusually high finishes and delivers maximum power at the cutting point - without the use of belts, chains, or sprockets. ABRASIVE design includes fast automatic feeds and built-in shock absorber to cushion shock of table reversal. Vertical feed dial is accurately graduated to .0001" for work to close limits. The massive one-piece bed casting minimizes vibration and insures perfect alignment and long machine life. In the toolroom and on the production line the No. M-3 is a top performer.

Write for information

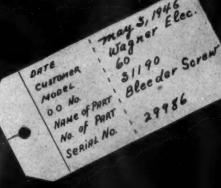


For information regarding Abrasive Machines on the Government Surplus Tool List, send us serial number of the machine. We will endeavor to provide attachments, accessories and repair parts as desired.



ABRASIVE MACHINE TOOL CO., East Providence 14, Rhode Island

# **PRODUCTION**



6 OPERATIONS
4.15 SECONDS PER PIECE
869 PIECES PER HOUR AVERAGE

New Britain Model 60 Multiple Spindle Automatic Screw Machine on which the part shown above is machined.



For more, better parts per hour this year and years from now, it pays to pick

### NEW BRITAIN

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

M-01051-B

December, 1946

MACHINE TOOL BLUE BOOK

109

# For That <u>Extra</u> Edge In Production



Nelco Carboloy-Tipped Side Milling Cutters (for Straddle Milling, Half-Side Milling and Slotting) mill up to 20 times faster than old-style tools. In addition, these cutters produce many more pieces between grinds with a much finer finish.

Designed by craftsmen with custom-built precision that insures better production and workmanship, Nelco Side Mills have all-alloy steel bodies . thicker, sandwiched-brazed, diamond-ground tips that assure longer tool life and more regrinds.



These Nelco tools are copper or cadmium plated for quick job identification and to prevent rust: copper plated for steel and steel alloy jobs; cadmium plated for non-ferrous, cast iron and plastic material jobs.

All these extra features at no extra cost are found only in Nelco Carboloy-Tipped Side Milling Cutters . . . manufactured in sizes from 3" to 8" dia. and 1/8" to 1" width, and are available from stock, All Nelco tools are shipped individually protected by a plastic coating.



### On Request!

Your copy of this new 28-page catalog illustrating and describing the complete line of Nelco Carboloy-Tipped Cutting Tools. Includes valuable engineering data and price lists. Send for it



### TOOL CO., For That EXTRA EDGE In Production

**Executive Offices and Plant** 

370 Hamilton Avenue, Dept. 3, Brooklyn 31, N. Y.

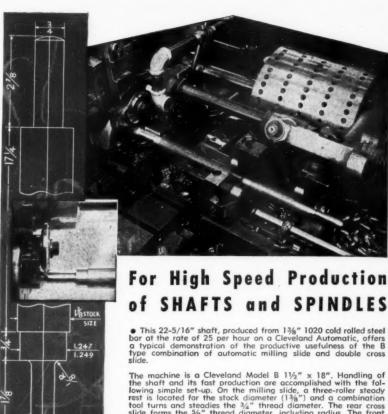
Any One of These Well Known Distributors Will Be Glad To Serve You

Albany-Sager-Spuck Supply Co., Inc. Detroit-B-H Tool and Supply Co. Baltimore-L. A. Benson Co., Inc. Bridgeport-Hawley Hardware Co. Brooklyn-A. N. Nelson, Inc. Cambridge-Robert E. Morris Co. Chicago-Irving A. Hecht & Assoc. Cleveland-J. W. Mull, Jr.

Detroit-Booth & Shaw Indianapolis-J. W. Mull, Jr. Los Ángeles-Murphy-Denis Corp. of Cal. Buffalo-Beals McCarthy & Rogers, Inc. Monroe, N. C.-Tool Service Engineer's Co. Newark-A. N. Nelson, Inc. General Carbides Co. Div.

Philadelphia-Carey-McFall Co.

Pittsburgh-J. W. Mull, Jr. Providence-Providence Mill Supply Co. Rochester-Beals McCarthy & Rogers, Inc. Syracuse—A. V. Wiggins & Co. Toledo—J. W. Mull, Jr. West Hartford-Robert E. Morris Co. Worcester-Brierly, Lombard & Co. York, Pa.-L. A. Benson Co., Inc.



of SHAFTS and SPINDLES

 This 22-5/16" shaft, produced from 13/8" 1020 cold rolled steel bar at the rate of 25 per hour on a Cleveland Automatic, offers a typical demonstration of the productive usefulness of the B type combination of automatic milling slide and double cross

The machine is a Cleveland Model B  $1\frac{1}{2}$ " x 18". Handling of the shaft and its fast production are accomplished with the folthe snart and its rast production are accompanied with the lowing simple set-up. On the milling slide, a three-roller steady rest is located for the stock diameter ( $1\frac{1}{2}6^{\prime\prime\prime}$ ) and a combination tool turns and steadies the  $3\frac{1}{4}$ " thread diameter. The rear cross slide forms the 1/4" thread diameter, including radius. The front cross slide forms the 1.249 diameter to size, both cross slides completing their work during the turning time. The independent cut-off, with a circular cut-off tool, is set to cut off and radius the back end of the shaft and radius the front of the incoming piece simultaneously.

Just another example of day in and day out cost cutting with Clevelands. Let us propose cost cuts for YOUR production.

### THE CLEVELAND AUTOMATIC MACHINE CO.

2277 Ashland Road · CLEVELAND 3, OHIO

BRANCHES: Chicago . Detroit . New York . Cincinnati . Hartford



# Use this for GENERAL BORING and for BORING THROUGH HOLES

Boring diameters from 3/32" up Known as STYLE A



# Use this for BORING BLIND HOLES and BOTTOMING AND FACING

Boring diameters from 3/16" up Known as STYLE B



# Use this for INTERNAL THREADING

Thread diameters from 1/4" up
Known as STYLE C

Because the design of all Bokum Boring and Threading Tools provides a helical relief that assures constant clearance angles throughout entire life of tool—reducing the necessity for resharpening to only one face and thus reducing down time—these tools are regarded as "tops" in all shops where high production is sought. Finish lapped cutting surfaces produce better bores with faster feeds.

Send for folder describing new holder with quick, simple vertical adjustment.

Send for catalog showing all these efficient tools—Ask for H-1139 for super high-speed tools and H-398 for carbide tipped tools.



BOKUM TOOL CO.

14775 WILDEMERE AVE. . DETROIT 21, MICH.

SINGLE POINT BORING TOOLS-INTERNAL THREADING, BOTTOMING AND FACING TOOLS-CARBIDE TIPPED TOOLS

# DRILL SIZE PIN GAGES

\$100 ANY SIZE

Polish
TOLEI
Overa
Lower

Polished Radius Top

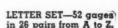
TOLERANCE +.0001 -.0000

Overall Length 11/2"

LOWER HALF TAPERED for easy insertion

Oil Hardened Tool Steel

Class Z Accuracy



Flat Ground Bottom

S45 set.
FRACTION SET—60

gages in 30 pairs in steps of 1/64" from 3/64" to 1/2". \$50 set.

NUMBER SET — 120 gages in 60 pairs from 1 to 60, \$90 set.

All sets include stands
... Prices F.O.B. Bridgeport, Conn.

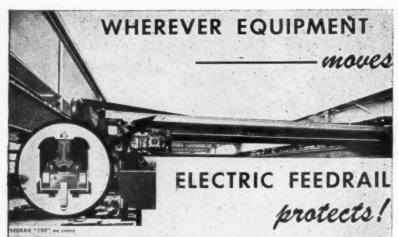
Sets in pairs of gages for checking any number of similar holes. Stands have 3 plates and cover so that gages stand upright. Drill size is plainly stamped in front of each gage hole, together with decimal equivalent to the ten thousandth of an inch.

### IMMEDIATE DELIVERY - 116 SIZES

Check or M.O. should include .08c postage for quantities less than Set. Sets shipped Express Collect. No C.O.D.'s.

THE Horbery GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT 1. CONNECTICUT





EEDRAIL on cutting and moving clath lay-

O

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December, 1946

MACHINE TOOL BLUE BOOK

115

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10. Machined diameter at nose for special adaptations.

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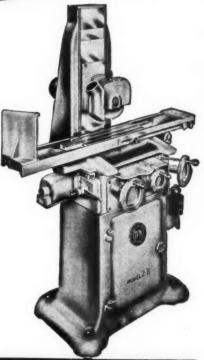
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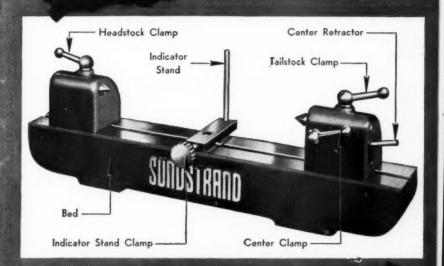


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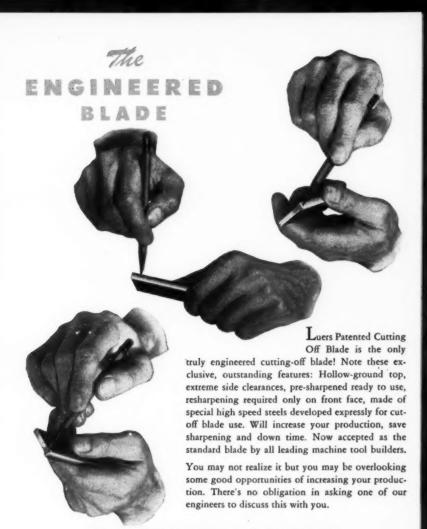


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# Featured In This Issue

DESIGN CONSIDERATIONS FOR WELDED MACHINERY PARTS. Part two of George L. Snyder's discussions of practical methods of designing for welding. His down-to-earth treatment of the subject will save time and money. Page	BASIC REQUIREMENTS OF LUBRI- CATING OIL MAINTENANCE. An authoritative analysis of lubrication for the internal combustion engines by Walter C. Bauer. Mr. Bauer is largely responsible for the introduction of oil maintenance to industrial internal com- bustion engines. Page
ALUMINUM PALLETS. The savings made possible through the use of pallets in loading, unloading, shipping, and handling is described, simply and to the point. Facts and figures are given. Page	KEY FACTS ABOUT KEYS. Part two of H. F. William's popular series on Keys, their design and construction. Page
CARBIDE CENTER TIP. An interesting article on the use of Carbide center tipped tube flaring tool. Page168.	FOREMANSHIP FORUM. Ed Motters- head presents some sound, hard-headed advice on conference meetings how and when to speak and what to say. Page
LETTER FROM ENGLAND. Robert Hutcheson of "Machine Shop Maga- zine", London, England, sends the latest news of industrial development in England. Page175.	EYE SAFETY. A further discussion, by Ernest W. Fair, of the value of eye examination. Safety steps to prevent eye injury are also covered. Page265.
NEW EYE-TESTER. A description of the new method of measuring a work- er's visual aptitude for a given job. Page185.	WHAT'S NEW IN METALWORKING. Page
PRECISION MEASUREMENT, Part VI, discusses electrical and mechanical comparators their uses and various	LET'S TALK SHOP. Page291.
parts and explains authoritatively how to use properly to best advantage.  Page189.	NEW LITERATURE. Page356.  MECHANICS THROUGH THE AGES. Page364.
SILICONE RUBBER. A discussion of the synthetic rubber product and its special adaptability as gaskets. Well il- lustrated, the article shows many ap-	PRODUCTS INDEX. Page390.
plications of Silicone. Page221.	ADVERTISERS' INDEX. Page398.

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Precision

LATHES



Equip Your Lathes with Complete Sets

A complete set of cellets is especially helpful for teolroom and maintenance work. Often the time saved in getting out a single rush job without having te wait far a specially ordered cellet will more than compensate for the cest of a full set of cellets. South Bend Collets are made in four types, and are available in either steel or brass. Each cellet is carefully inspected and tested before it is packed for shipment.

South Bend Lathes help to increase plant efficiency and profits by raising precision standards both in the toolroom and in the production shop.

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South Bend Engine Lathes and Toolroom Lathes are made with 9", 10", 13", 14½", and 16" swings, bed lengths to 12', and collet capacities to 1". Precision Turret Lathes are made with collet capacities to ½" and 1". Write today for Catalog 100-D which illustrates and describes the complete line of lathes and accessories.

LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS



# as The Editor Sees It

### **Machine Tool Shipments**

During September shipments of machine tools fell \$1.5 millions below August. This reflects the production difficulties of almost all machine tool builders. While figures for October and November are unavailable at this writing, there is meagre basis for assuming any radical departure from the general

vicinity of the September figure.

Pig iron, copper, lead, electric motors are exerting a restrictive influence on production. Employees of a New England machine tool builder went fishing for a week . . . for want of pig iron. The scarcity of pig iron is especially acute in New England. Many plants live on a month to month basis, never knowing when their next shipment will arrive. One manufacturer considers the situation "serious."

An electric tool manufacturer in upstate New York is running only 40% of production . . . no motors. The best delivery prophecy that motor manufacturers can make is "later in 1947". They, too, are hampered . . . principally by a lack of copper.

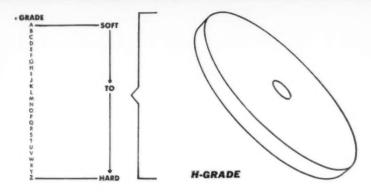
New orders for September ran 12% behind August. Again a reflection of the over all production picture. Manufacturers, discouraged by the lack of materials, have had to revamp their production figures and are developing a "let's wait and see" attitude. With the return of materials and the long overdue all out production drive, orders for machine tools should increase.

Uncertainty over the outcome of the November election furthered industry's "let's wait and see" attitude. Now that the elections are decided and the new Congress is dedicated to the removal of many governmental restrictions and plans to let business solve its own problems without restrictive governmental interference, the general production picture looks hopeful.

In spite of the fact that shipments for September were below August, cancellations in August were higher than for September . . . approximately 33% more cancellations than in September. Nevertheless, sales managers are keeping a sharp eye on their respective markets as well as on the order books.

William 7. Schleicher

Editor-in-Chief



# There's more to grinding wheel



The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hard-

ness, they make it easier to select the correct wheel for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

You realize, for instance, that wheel

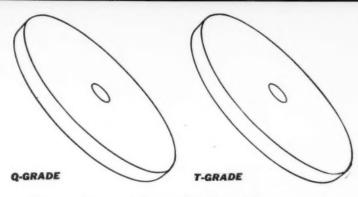
speed itself affects grinding action. The same grade reacts differently at various speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish...required tolerance must be considered. Coolant conditions vary. The actual type of operation—snagging, surfacing, internal grinding or whatever it is—influences practical selection.

Yes—there are many important factors to check before you can be sure of the right grade designation for the job.

# A good rule for good grinding... CALL



132



# grades than the A, B, C's

That's why we suggest consulting your CARBORUNDUM salesman or our distributor's representative. These men work throughout the year on a wide variety of grinding problems. They are familiar with grinding in production... in tool rooms...wherever it is used. They have practical knowledge and experience to help you pick exactly the wheel you need for the job.

Assisting these representatives in the field are our Abrasive Engineers, Specialized experts, they are equipped to analyze uncommon problems...recommend sound solutions. And, here in our modern laboratories are scientists and technicians who are working on the application of abrasive developments to changing grinding practices.

This three way route to better grinding is easy to use. No obligations are incurred. Merely talk "grinding" with a CARBORUNDUM representative. He'll be glad to assist you. The Carborundum Company, Niagara Falls, N. Y.

# IN CARBORUNDUM

TRADE MARK

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Silicon Carbide Aluminum Oxide Diamond

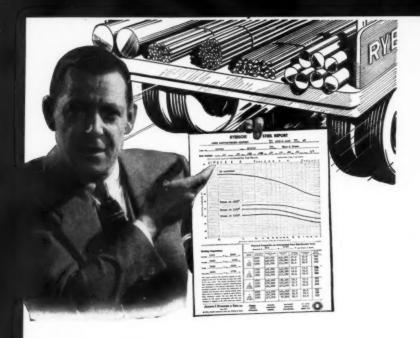
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This additional service on alloys is rushed to you at no extra cost. The report, together with a complete range of certified alloys in stock, establishes Ryerson as first source for quick shipment of alloy steel,

One of twelve Ryerson plants is convenient to you. Call, wire or write for prompt, versatile service.

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# RYERSON STEEL

# DESIGN CONSIDERATIONS FOR WELDED MACHINERY PARTS

By GEORGE L. SNYDER\*

Part Two

### FABRICATION

Having considered the production and application of components, the subject of fabrication from the designer's viewpoint in developing a weldment is the next consideration. The first aspect covers the type and extent of available equipment in a weldery which will produce the pieces designed. This is important since the more flexible and extensive the equipment, the more freedom there is in design. In addition, when quantities are involved, advantage may be gained in designing the job to suit particular facilities of a weldery. Usually, it is well to consult with the engineering staff of the weldery most likely to be involved regarding these matters, particularly if repetitive items are contemplated.

Production methods concerning the fabrication of weldments may be considered from two aspects. The first involves the extent of what might be termed "universal" equipment, such as positioning facilities, automatic welding units, inspection methods, and stress re-

lieving facilities. Many types and sizes of positioning equipment are in use in welderies today. The second aspect involves special jigs or fixtures or other types of tooling that might be justified or imperative. Usually, if the product is to any degree repetitive in quantity, the possibilities in special tooling should be considered.

Also to be considered by the designer to promote economy and quality is the possibility of breaking up the weldment into sub-assemblies in sizes to suit positioning equipment. If the final size of the part as designed exceeds the limits of available equipment, possibly it can be redesigned so that a minimum of handling of the piece in its final size is necessary. Often, the use of automatic welding equipment with its finite scope and features merits a thought in designing the weldment, especially in considering the advantage such equipment offers for cost reduction.

With special tooling, the designer should keep in mind that he is dealing still with rough component parts despite measures that might have been taken to minimize tolerances. Weld shop tooling naturally is more restricted than

. . .

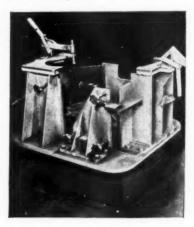
\*Chief Engineer and Assistant to General Manager Lukenweld, Inc., Division of Lukens Steel Company, Coatesville, Pa. that usually available in machine shops. Tools, such as jigs or fixtures, should be designed with the necessity of flexibility in mind. Fig. 20 shows two special fixtures which are typical.

Special tooling also might be mandatory in order to hold components in proper relation to each other during the welding operation. Fig. 21 shows a special fixture with the weldment in place.

#### Sub-Assemblies

Although sub-assemblies frequently are important to the designer of weldments, design limitations often prohibit their use. Obviously, the more work done on small pieces, the easier and quicker will be the completion of the final assembly.

A completely welded sub-assembly is shown in Fig. 22. Fig. 23 pictures the final weldment. Here, design controls the method of fabrication, for the lower flange member could be made in one piece. In that case, at least a portion of the sub-assembly welding would have been required on the larger and more cumbersome piece.



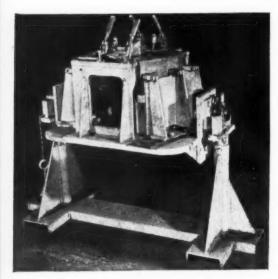


Fig. 20—Two specially designed fixtures for tooling and Fig. 20A—Weldments in quantity production,

TO COMPLETE





### ADD THE RIGHT STARRETT TOOL

Add a Starrett Vernier Height Gage to the photo above and you have a picture that is familiar wherever fine precision work is done. Starrett Tools inspire the confidence of those who use them—help them make the most of their skill and experience. That's why it pays to insist upon Starrett Tools for all important measuring and inspection jobs. Be sure to specify Starrett when you requisition precision measuring tools.

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World's Greatest Toolmakers

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PRECISION TOOLS + DIAL INDICATORS + STEEL TAPES + GROUND PLAT STOCK
HACKEAWS + BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

Sub-assemblies of components should be made so that particular portions in certain instances can be sized before they become part of the final weldment. This practice helps insure that the final weldment is close to required dimensions. Where tolerances have accumulated, straightening or trimming might be involved. The effect of the welding on the completed sub-assembly from the standpoint of warpage or shrinkage has been eliminated as a factor on the finished weldment.

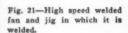
Sometimes in very complicated structures involving considerable welding, various sub-assemblies are stress relieved before being assembled into the whole structure to reduce the accumulation of residual stresses.

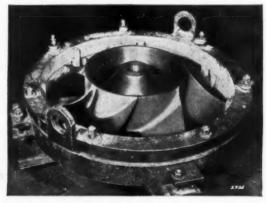
Sub-assemblies also facilitate inspection of welds. At times, where X-ray inspection is specified, sub-assembly welding is necessary, for, if the welding were not completed and X-rayed in the sub-assembly, the interference of adjacent components in the completed assembly might make it impossible to X-ray or repair such welds.

At times, sub-assemblies are welded completely when they include compartments subjected to pressure tests or oil retention specifications.

Tests are made and necessary repairs completed on the sub-assembly piece. Clearly, such practice is more economical than to attempt such work on the final piece, if only from the standpoint of the relative bulk to be handled in testing and repairing.

An important reason for careful consideration of sub-assembly possibilities in design is the provision of maximum access for the greatest possible amount of the welding to be done, for the more accessible the welding, the less it will cost. Also, quality is more readily achieved if the welding operator can work under open or accessible conditions. Fig. 24 shows a sub-assembly on which all welding to be done is before the operator. Fig. 25 shows the completed weldment with the sub-assembly in place. Obviously, welding has been simplified since the joining welds between sub- and main assemblies are completed by working through the access openings shown. If the welding had not been completed in the sub-assembly it would have had to be performed thru such openings. This would have necessitated the use of a mirror by the welder with resulting slow and conse-





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Fig. 22—One sub-assembled component of a weldment. Welding is completed before further assembly is done.

quently expensive welding.

At times it is advantageous to design so that progressive sub-assembly is possible. Thus, one portion of the weldment is completed before it is assembled and welded to other components as a step in the final assembly of the completed weldment.

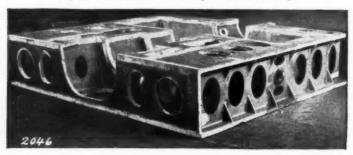
If maximum access is provided, by sub-assembly practice or other design control, inspection can be more conclusive. Fig. 23 illustrates design for accessibility with elliptically shaped openings permitting access to the inner side of the joints to be welded. Here, desirable structural qualities of a box member are not sacrificed for access,

but care has been taken in shaping the openings so that abrupt discontinuities in the contour of the members are avoided.

Welded joints of maximum quality and predictability from the standpoint of either external contour or internal soundness are almost impossible to execute with the manual arc if the joint is not reasonably accessible from both sides. However, at certain points where stresses are of secondary nature and fatigue loading is not present in structures, the joints do not require work on both sides.

In addition to the type of welded joints used, their position in the weldment deserves careful design consideration for several important reasons besides positioning them for maximum access. Where machined surfaces occur in the design, care in placing joints can effect economy as comparative illustrations given in Fig. 26 show. Clearly, if the joint is placed as in Fig. 26-a, a portion of the deposited weld metal will be removed in machining operations. Depositing weld metal is expensive and removing it is wasteful. The joint placed in Fig. 26-b shows how the amount of necessary weld metal has been reduced. The joint shown need only have the cross-sectional area of that shown in Fig. 26-a after it is machined. Economy

Fig. 23-Lower section of welded gear reduction housing.





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may be possible by positioning a joint as shown in Fig. 26-c which eliminates the kerf and its cost, or 26-d which also simplifies fitting, in contrast to the same joint detailed in Fig. 26-a.

At times, spoked or diagonal members are indicated by design considerations and their intersection usually presents a type of joint difficult to fit and costly to weld if proper external contours are to be maintained. An example is shown in Fig. 27. Here the diagonal pattern of the box stiffeners on the underside of this machinery bed is highly desirable from the standpoint of maximum rigidity. However, their central intersection presents a problem of the nature just described. By the utilization of a flame-cut central member, square joints at the intersection have been obtained; hence, fitting and welding are simplified.

Fig. 28 shows a simple treatment of an intersection of spokes. The central member in this is the sub-assembly so designed that the spokes do not converge on each other with obviously poor fitting and welding conditions resulting. An illustrative sketch showing the construction of this central hub is given in Fig. 29.

#### Intersections

At intersections of members subject to high stress levels, fatigue, impact, or a combination of these, careful design treatment is imperative. Contrasting designs of such an intersection are shown in Fig. 30, where the left illustration shows the intersection as welded without benefit of a transition member. Clearly, in order to provide curved contours, an inordinate amount of weld metal would be necessary. In addition, it is practically impossible to execute such a welded joint so that full predictable strength will result. If necessary, X-ray inspection is practically impossible. Fitting conditions are poor and the excessive amount of weld metal adds to warpage and shrinkage prob-



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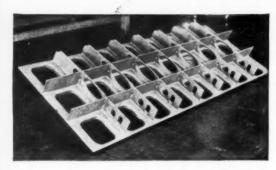


Fig. 24—Welded sub-assembly, with all welding readily accessible,

lems. Desirable features of a similar joint as executed in the right illustration are self-evident.

The designer should remember the generality that in a weldment the fewer separate and different components required, the cheaper and better the design will be.

At times, particularly with secondary

members such as ribs or stiffeners, slight changes will permit uniformity in size of different components. Such consideration might make quantity production by blanking economically possible. Another somewhat minor consideration is the difficulty caused the assembler or fitter in trying to identify parts that appear almost the same.

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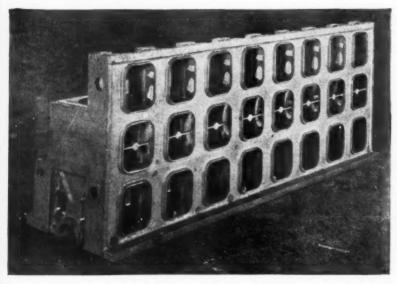
The designer should keep in mind, also, the possible utilization of hot rolled bar stock, for often such material can be used by making a slight change in dimension of a given cross-section to conform to standards.

All components regardless of the method of producing them, are subject to dimensional tolerances. The designer must keep this in mind for economy and good fit-up so that he can control the ill effects of cumulative tolerances. Fig. 31 gives a simple illustration of a typical weldment in which the designer has kept cumulative tolerances in mind. The drawing at the left shows a partial cross-section, while the drawing at the right shows a similar cross-section in which the point has been ignored.

### Shrinkage and Warpage

Shrinkage and warpage problems which exist in the production of weld-

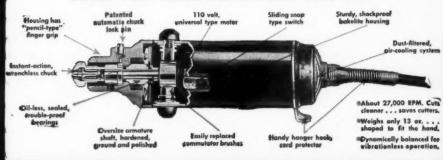
Fig. 25-Weldment shown in Fig. 24, is a part of this weldment.





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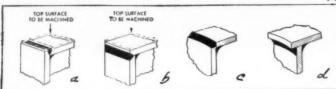


Fig. 26-Types of welded units which deserve design considerations.

ments will continue to be a factor so long as drastic heat gradients occur during welding. A degree of experience is needed to be able to predict such effects and to control and counteract them. It is impossible to discuss this factor here in detail. The designer should, however, sense the general aspects of such phenomena so that he does not develop designs that may be impossible to produce within necessary tolerances.

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Warpage will occur to a great or little degree depending on the relative size of given welds and their distances from the neutral axis of the assembly. This is due simply to the relative ability of a member to resist shrinkage stress imposed at different points in its cross-section with respect to the neutral axis of that cross-section.

Welding results in shrinkage both longitudinally and at right angles to the weld metal. The extent varies for sizes as well as types of welds. When the number of different sizes and types of welds occurring in an average weldment and their length and position with respect to each other are considered, it can be realized that control of warpage is to a large degree a matter of practical experience. Sequence of welding also should be carefully controlled as a counteracting measure. At times, special fixtures are used to restrain warpage during welding.

Conditioning and Inspection Methods

Following completion of welding it is an established practice to condition the weldment by removing spatter, grinding edges or surfaces where speci-

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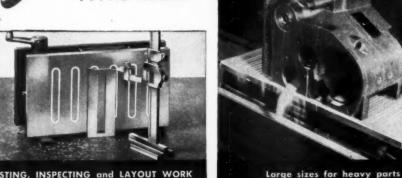


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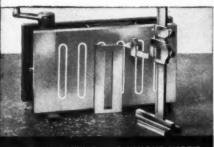
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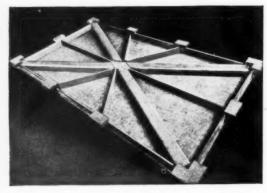


Fig. 27—Stiffener arrangement on under side of shallow machine bed.

fied because of design requirements, and grit blasting when size permits.

Spatter is removed for appearance and to insure that it will not drop off progressively when the weldment is in service. Spatter can be detrimental mechanically if, for instance, it were left in a lubricating oil compartment.

Weldments are grit blasted to remove mill scale from plate surfaces and to facilitate visual inspection of welds. Under-cuts usually are more difficult to detect before the weld is grit blasted.

Welds are inspected visually for proper size, surface cracks or other surface defects. X-ray is used to inspect welds for internal defects. Various specifications such as those of the ASME and the U. S. Navy provide inspection standards for the acceptance or rejection of welds by means of X-ray photographs.

Hydrostatic testing often is required by design specification. Oil tight compartments should be checked and tested before the part leaves the weldery. Finally, the weldment should be laid out for a final inspection at the weldery to verify that it is dimensionally correct within specified tolerances.

Any weldment to be machined, subsequently, to any appreciable degree

Fig. 28—Two halves of large welded machine part which are welded into one piece after shipment to destination.



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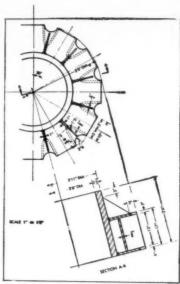


Fig. 29—Detail of construction of center hub in piece shown in Fig. 28,

should be stress relieved if the machined surface or other parts of the weldment are to hold their relationship within service life. Any weldment subjected to severe stresses or to fatigue or impact, also, should be stress relieved. Especially is this advisable since locked-up stresses, the magnitude or direction of which cannot be predicted can be of a high order following welding. If normal service loading imposes design stresses having the same direction at a given point as that of a residual or locked-up weld stress, structural distress or failure can result.

Many weldments are in use that have not been stress relieved. Hence, definite predictions cannot be made that difficulty will result for a given type of weldment in the unstress-relieved state. Stress relief therefore, may be regarded somewhat like insurance having a low

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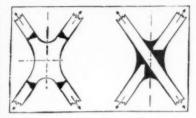


Fig. 30-Types of intersection, without, and with spline piece.

premium rate because the per pound cost of stress relieving is usually only a fraction of a cent.

### Specifications

A weldment should be specified clearly and concisely so that no misunderstanding results, and to insure, from the equitable standpoint that each potential vendor is quoting on the same conditions. It is important for instance, that the weldery know if the weldment must be produced under a code requirement.

Over-all tolerance requirements on various dimensions of the weldment should be considered carefully. The designer might be inclined to make everything tight to "be on the safe side." But this can be a costly practice compared to that of intelligently evaluating requirements. Often a relatively close





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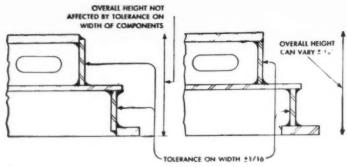


Fig. 31-Effects of controlling cumulative tolerances.

tolerance, under given conditions of size, shape and amount of welding, at some point in a weldment can be costly to achieve. Proper study might show that the tolerance can be loosened with-

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out affecting the service performance of the weldment. In this instance, it is common practice to consult with the weldery to achieve, mutually, the best conditions.



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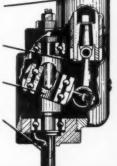


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By T. O. Palmer\*



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IMPORTANT savings possible in shipping and handling large quantities of goods of all types in unit loads on pallets was demonstrated by the wartime experience of the U. S. Army and Navy. All suppliers were asked to make shipments to the armed forces on standardized pallets which greatly facilitated movement of goods from manufacturing plants to supply depots, to shipboard, to foreign supply dumps, to disbursing points.

Throughout all these movements, goods were handled on pallets in unit loads by means of power-driven industrial-type fork trucks. Typical savings in moving a shipment of 100 tons amounted to 479 man-hours, according to estimates by Navy handling experts.

Moving the cargo loose would have required 682 man-hours as against 203 for the same cargo palletized. Approximately 77 pallet loads accommodate the same amount of goods that require 4080 separate packages when shipped loose.

### Why Break Bulk

These important savings are made possible because, in palletized shipping the goods are handled "in bulk", each "package" or piece consisting of a pallet with its load, which is handled as a single unit through all moving, loading, unloading, storage, reloading, and similar operations. Such "unit loads" usually weigh a ton or more and are picked up, moved about and set down or easily tiered by modern power-driven industrial-type fork trucks. Of course, other mechanical handling equipment is also suitable for working loaded pallets.

These bulk packages or unit loads do not have to be broken at any point in the shipping sequence from the production line to point of ultimate consumption. The importance of this feature cannot be over-emphasized as it means savings are obtained at every point of handling by doing the work with a truck or other mechanical handling device instead of by hand.

What can be obtained in reduced costs is easily evident from the following examples:

#### Performance Ratio

It formerly took 14 men 4 hours to

\*Industry Manager Materials Handling & Container Div. Reynolds Metals Co., Inc., Louisville 1, Ky.



Aluminum pallets for shipping goods by highway truck save 67 pounds per pallet, permitting just that much more material to be carried by the truck and also cutting shipping charges. Palletized loads and the fork truck make remarkably short work of loading-unloading operations as is shown here.

unload a freight car stowed by old methods. Now it is reported that this same job is handled in 2 hours by an operator with a fork truck. Because the loads have been palletized, the fork truck is able to pick up a large unit load and show a performance ratio of 28 to 1 that is 56 man-hours as against 2 man-hours.

Of course this is an extreme case, but other more typical savings are important. In loading another product, it is common for a fork truck to handle 30 boxes at a time. Hand truckmen move only 5 at a time. In unloading operations which are equally important, 144 tons are being transported every 8 hours from car to storage to cut handling costs 35-55 per cent.

### Wide Application

Palletizing is suitable for moving almost any kind of material. It has been successfully applied to such items as rakes and shovels, machinery, tools, bulk material in large paper bags, and odd-shaped electrical equipment components, etc. The armed forces used this

method to handle ammunition, and all types of supplies. Published records of performances by the Navy show loading and unloading of palletized shipments in as little as 0.5-man-hour per freight car.

Of course these results were obtained under ideal conditions. However, records over a period of time show a normal expectancy for loading and unloading palletized shipments (including removal from or placement into storage) running from 8 to 15 tons of goods per man-hour. This compares with 1½ to 3 tons per man-hour normally obtained with non-palletized shipments of the same goods.

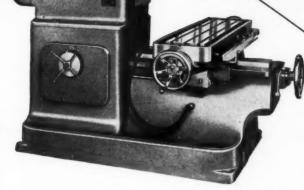
Handling experts feel it is conservative to say that labor savings of 50 per cent or more can be obtained by nearly any shipper not now using this method.

### Handling Costs "Lost"

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December, 1946

MACHINE TOOL BLUE BOOK

161

# THIS SIGN MEANS HEADQUARTERS for WALTON TAP EXTRACTORS



Wherever you see this display you will find an authorized Walton Dealer. He has descriptive folders, price lists, and complete information about all Walton Tap Extractors.

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skilled work. Skilled labor driving power-driven fork trucks produces more and earns more with less effort.

Handling engineers have determined that 20 to 50 per cent or even more of the total cost of producing many items lies in the expense of moving the work about the plant. These excessive handling costs, however, are often effectively hidden by older costing methods which allocate cost of moving work to and away from a machine to the cost of work done on the machine, instead of segregating handling costs.

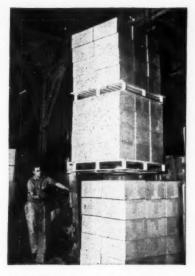
Many plant managers have "done something" about this with the result that where materials are to be handled in large enough quantities to make pallet loads, fork-truck-pallet handling and storage are widely used on work inside large plants.

### Interplant vs Intraplant Shipping

A fork-truck-pallet system designed for use outside of the plant of origin as



Standard 40x48x534" aluminum pallet. The rigid welded one-piece lower deck is securely riveted to the upper deck through tubular load carrying members.

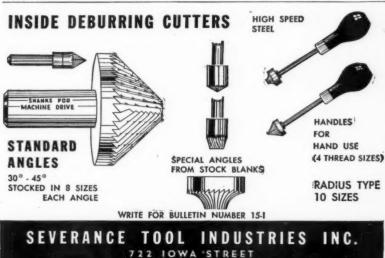


In temporary storage area alongside loading docks, tiering type fork truck permits pallet loads to be stacked to full height of the ceiling, thus greatly increasing storage capacity per square foot of floor area. The Reynolds aluminum pallet has ample bearing area to prevent crushing lower loads even when material is tiered to maximum heights.

well as inside that plant requires more careful and thorough planning than does a system for inside or intraplant movements only. This is because of the added factor of freight cost.

At the present time, all pallets take the same freight rate as the goods they carry. Thus a carload of canned fruits and vegetables involves a charge of \$18.50 for the 36 pallets (at 100 lb. each) on a typical shipment from New York to Chicago. The shipping charges on the same pallets, if they carried clothing, would be \$51.00.

Thus palletizing of goods that take a high freight rate involves an almost prohibitive shipping charge on the older



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type pallets themselves. This limiting factor has had a great influence in preventing the extension of the fork-truckpallet methods of handling, to many shipping operations, where it should be used.

It is evident that the full advantages obtainable from the unit-load movement of goods on pallets can be had only when the goods stay on the same pallet throughout all movements from end of production line in the plant, to temporary storage in the plant, to shipping platform, through loading of freight car, freight car movement to warehouse, unloading and storage at warehouse, and subsequent movement from warehouse to jobber, to retailer.

Obviously, the right type of pallet is essential to obtain the full benefits of unit-load movement to reduce loading and unloading costs, and in shortening turn-around time for freight cars and highway trucks.

### **Aluminum Pallets**

The development of standardized aluminum pallets for use in handling goods, where continued movement is involved, is an important step in permitting the advantages of unit-load handling to be extended to shipments over freight and truck lines. Also they are of value in subsequent movements through warehouse, to jobber and large retailer if the material is net long inactive.

To explain how the aluminum pallet



### ABRASIVE CENT-R-LAP TOOL

Saves time, eliminates diamond dressing, Cones changed in seconds. Available in 2 sizes  $\frac{9}{2}$ " and  $\frac{9}{2}$ " Cent-R-Laps and abrasive Cones.

Write for descriptive literature and prices.

J. R. Reich Manufacturing Co. 45 E. Stroop Rd. Dayton 9, Ohio enlarges the scope of fork-truck-pallet handling and shipping, it is necessary to present a comparison of shipping charges.

Since a 40x48x5¾" aluminum pallet weighs 36 lb. compared with about 100 for same size pallets made of other materials, shipping on aluminum pallets saves freight charges on 64 lb. per pallet. Let's see how this works out for a typical shipment:

The cost of sending a certain type of palletized goods from Detroit to Louisville, a typical rail movement (400 miles), is \$1.00 per 100 lb. or 1c a pound. Since the aluminum pallet weighs only 36 against 100 lb. for other pallets, a saving of 64c per pallet is obtained on the outgoing shipment.

Return shipment of the standard aluminum pallets, is at a rate of \$0.36 per 100 lb. A 40' 6"x10'x9'2" freight car will hold 540 pallets, either wood or aluminum. This means a carload of wood pallets weighing 54,000 lb. would

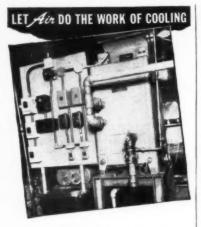


View of Reynolds all-aluminum pallet showing upper deck with corrugated surface sheet. Note overhang of upper deck at each end of pallet, permitting handling of pallet loads aboard ship by means of safety bar type slings.

cost \$194.40-or 36c per pallet.

On the other hand, a carload of aluminum pallets would weigh only 19,400 lb. But minimum carload weight is 30,000 lb. so freight charge would be based on that weight, which would mean a cost of \$108.00 per car—or 20c per pallet. This represents a saving of 16c per





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pallet on the return trip. Aluminum pallets thus save 64c each going out, plus 16c each on the return shipment—or 80c per round trip.

Aluminum pallets also present safety factors since they are non-sparking and non-combustible. Also, even when badly worn, there are no splinters or sharp edges to form a hazard.

### Lift Eight-Ways

The aluminum pallets are designed so the forks of the truck may enter the pallet from any one of the four sides or any of the four corners. This means that such a pallet can be set down from one direction and picked up from another, affording added flexibility in stowing and removing stows. Also less space is required for maneuvering the truck since it need only make a 45° turn from an aisle to enter the pallet from the corner. Too, steel straps can be used lengthwise as well as crosswise such pallets, providing stronger unit loads. The Reynolds pallet has withstood loads up to 26,000 lb. without damage.

A rigid welded one-piece lower deck is securely riveted to the upper deck through tubular load carrying members. Accompanying illustrations show standard 40x48x534-in. units, the size widely employed in many industries. Other standard deck sizes include the 48x48, 32x40, and 42x50. The upper deck, as shown in Fig. 2, overhangs the lower at both ends by 2½", for attaching a safety bar sling for handling aboard ships.

### High Speed Cutting Tools

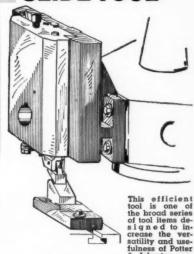
- Special high speed circular, devetail, flat form and special tool bits.
- Design and manufacture of small machines, jigs, gages and experimental parts.
- Regrinding and salvaging high speed flat form, special bits and small flat broaches.

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This vertical slide tool is designed for the special purpose of cutting a recess in an internal diameter at any predetermined location. The any predetermined location. The shaped cutter is carried by a bar held in the hole of the slide. When the cutter reaches the proper loca-

the cutter reaches the proper location, at end of turret movement, the
slide is raised by a cam block carried on the cross slide of the machine and makes the cut while the
turret feed dwells at that point. When the cut has been made to
desired depth, the cam block releases slide and cutter drops down
to its original position.

This tool is also used for taper boring, taper turning or crown turning, such as on pulleys, etc. When used on work of this kind, the tool slide is actuated by means of a former plate or cam fastened to cross slide base or to bracket on overhead pilot bar.

This tool is carefully designed and constructed for its special purpose, with rugged proportions adapted for accurate cuts.

Detailed dimensions and specifications are included in this helpful new catalog. If you use Potter & Johnston machines, many of the new tools illustrated and described will help you to reduce costs and speed production. May we send you a copy today — no obligation?



& Johnston automatic turret lathes.

he POTTER & JOHNSTON PAWTUCKET. RHODE

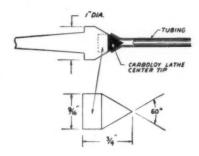
## CARBIDE LATHE CENTER TIP PROLONGS LIFE OF TUBE FLARING TOOL

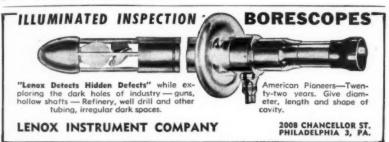
The idea of using Carboloy lathe center inserts as tube flaring tools is reported to have multiplied tool life at Douglas Aircraft Company, Inc., of Santa Monica, California, 10 to 1 compared with that obtained when conventional flaring tools, made from steel, were used.

The job to which these cemented carbide tipped tools are applied consists of flaring the ends of ¼, 5/16, ¾, ½, ¾ and ¾ inch ID, 24 and 14 ST aluminum tubing on a production basis. The machine employed for this purpose is a Leonard Precision Flaring Machine (see Fig. 1). Speed range of the machine is between 350 and 1000 rpm. It was found that the high end of the range gave the best results.

The flaring tool used in the machine (see sketch) is made up at the Douglas plant by brazing a stock Carboloy C-6

Sketch of Flaring Tool—Diagrammatic sketch of the operation. Note that the solid Carboloy lathe center tip used is large enough to take all the wear incurred by the tube flaring operation. There is no wear on the softer steel shank of the tool.





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> Illustrated Above

F. W. DERBYSHIRE, INC. Waltham 54, Massachusetts lathe center tip of solid cemented carbide to a tapered steel shank having a special taper to fit the machine. The lathe center insert is 9/16 inch O.D. This is large enough so that all the work done during the flaring operation is taken by the carbide and none by the less-wear-resistant steel shank.

Douglas estimated that the high speed steel flaring tools originally used on this job produced some 100 tubes before wearing out. The improvised Carboloy flaring tools turn out at least 1000 pieces each before wear becomes pronounced and the tip of the tool has to be replaced or reground. In addition to the saving in tool cost and the more continuous machine operation, the longer runs now obtained also mean greater consistency of work turned out, while pieces produced per hour have been raised some 35% due to the elimination of down time for tool changes. As a result of this experience, Douglas flaring tools for all other tube sizes up to 11/2" ID are being tipped with cemented carbide.

The tube flaring tool used in this installation at Douglas Aircraft is made by simply brazing a stock Carboloy cemented carbide lathe center insert to a tapered steel shank. Tool life has thereby been multiplied ten times.





# ANNOUNCING AN ADDITION TO THE NICHOLSON ROTARY FILE FAMILY

and Cut Rotary Files and Ground-from-Solid Burs with \( \frac{1}{3} \) inch shanks are now available under the name of the world's foremost file manufacturer — NICHOLSON. These small, powerdriven hand tools answer the widespread need of industrial craftsmen for quality burs in sizes designed for relatively delicate filing operations. They are usable especially in tool and die shops, jewelry, dental and optical plants. Operated with portable hand tools (air or electric), drill press, or

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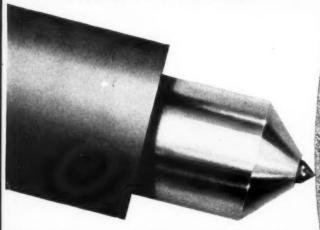
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DIAMOND HAND TOOLS

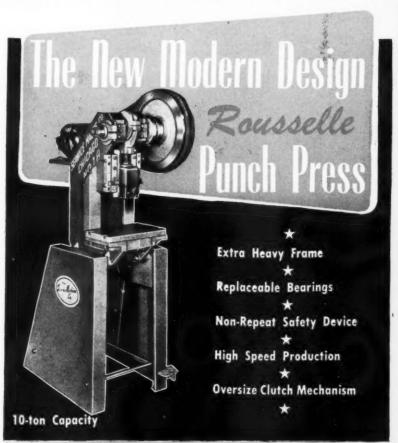


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STEEL-SLIDE VISES

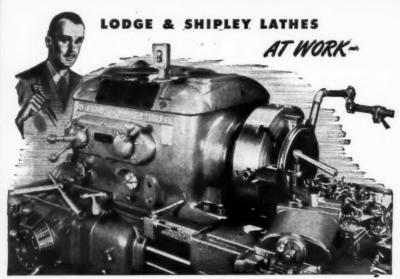
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## Letter from England



SOME concern at the position of sheet steel is being felt by the motor car industry. It appears that the motor car industry was not faced with the problems of other engineering industries in its change over from war to peace time production; therefore the motor car manufacturers were able to obtain reasonably adequate supplies of sheet steel because demands from elsewhere were not so heavy at the time. Now other types of engineering firms have got into their stride and are able to use more material, some of which is sheet steel.

The Government is proposing to reduce the sheet steel quotas to be allocated to the motor car trade in 1947. There is a strong feeling that a reduction in steel supplies will interfere seriously with the industry's export potential which is to be regretted very much in view of the capacity of the industry to cope with the demands made upon it. While the larger part of the industry's output is going abroad a certain part is for the home market and this too will be affected adversely to the disappointment of those who are waiting patiently for new cars.

One of the new outlets for steel sheet is in the building of certain types of pre-fabricated houses and as the temporary housing programme increases so will more and more steel sheet be needed. Housing has a high priority and is likely to keep it for some time to come.

Timber is scarce and steel is being used for all manner of kitchen cabinets and other household goods, and the shortage of iron castings for all purposes is the cause of more sheet steel and sectional steel being used for fabricating parts by welding.

In the machine tool trade there is an increasing use of welded fabrication, and this is most apparent in the replacement of heavy cast iron machine bases by neat welded structures. Low output of coal from British mines continues to worry every branch of industry and also the Ministry of Fuel. Absenteeism in the coal mines rose to just over eleven per cent in September, a reduction in man-hours that represents a seri-

ous loss of output.

The Minister of Fuel, Mr. Shinwell, is looking to the domestic consumer for economy in coal, gas and electricity during the coming winter. Economy on the part of industrial users will also be needed, and industrialists are in no small way concerned about their ability to maintain output of goods for home and overseas during retrenchment in the use of fuel.

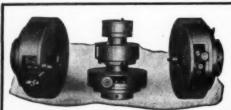
The manufacturers' opinion is that the production of more coal is the real solution to the fuel problem and that Governmental attention should be given to this solution rather than to urging economy by users who already get insufficient fuel.

Parliament re-opened on the eighth of October, soon after the Summer recess and one of the first measures introduced was the Atomic energy Bill which received its second reading. The Bill is intended to give the Government complete control over the use and development of atomic energy. A programme involving an expenditure of £30,000,000 for atomic development has had Government approval.

The Prime Minister, Mr. Attlee, said that the programme was under constant review and a far greater expenditure

than that given above might be needed.

An attempt to ease the labour shortage in iron foundries is to be made by the employment of 2,800 skilled foundry workers from Italy. According to the Parliamentary Secretary to the Ministry of Labour, Mr. Edwards, there is a shortage of 1,000,000 tons of castings a year compared with the year's output of 3,300,000 tons in 1938. The entry of the foreign workers has been agreed to by the Amalgamated Union of Foundry



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Workers at a conference when the question was put to vote.

Industrialization of the Scottish Highlands will be brought nearer upon the completion of a newly announced electricity scheme which it is estimated will cost £4,800,000. Briefly, the idea is to harness the power of the water that now runs through Glen Affric and Glen Cannich in Inverness-shire. It is proposed that current will be sold to users in the more industrialized area of south Scotland to compensate for the expense of distribution in the now very sparsely inhabited north.

Government owned factories which during the war years were engaged on armaments of various kinds are gradually changing over to peace time production. Naturally many are going over to equivalent peace time work for which their existing plant is suitable, and part of the Royal Ordnance Factory at Nottingham is being devoted to the building of machines for the manufacture of fully-fashioned stockings for women. The first order is for £1,000,000's worth of plant which will provide work for some 800 employees. This entry of the Government into textile engineering is intended to speed up the delivery of long-wanted plant and the Ministry of Supply are working in cooperation with a well-known firm of engineers

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After flame hardening, a stress-relieving draw is given all LeBlond bed ways to relieve the stresses set up by the hardening process. These shears test 63-66 Rockwell C (over 600 Brinell). They will outlast the useful life of the lathe. In addition, the LeBlond compensating vee-way principle is retained, aupporting the carriage at a right angle to the thrust of the tools.



Cross section view. Note the uniform structure of the soft metal core, the generous depth of the hardened outer case.



LeBlond flame hardened bed sections are joined to the bed by means of screws at intervals of six inches. It is easy to remove and replace them in the event of accidental damage. standard equipment

LeBlond flame-hardened and ground shears are furnished as standard equipment on both front and rear ways of all heavy duty engine lathes up to and including the 32" size, on all tool room lathes, and on all hollow spindle (oil country) lathes.

In addition to the bed ways, many other LeBlond lathe parts which are subject to wear are also flame-hardened. For example, on the 25" heavy duty engine lathe, I3 separate parts...shafts, gears, pinions, and bars... are flame-hardened by the LeBlond process for greater sustained accuracy and longer life.

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who will supply drawings, patterns and key workers. The firm concerned will use its sales organization for the marketing of the machines and an effort is being made to get British hosiery factories equipped with plant for making fully-fashioned stockings within two years.

The Amalgamated Engineering Union, having about three quarters of a million members, is the largest engineering union in the country and talks are in progress to promote a joining together of several other engineering unions with the Amalgamated Union to give one large body having about 1,500,000 members.

The relaxation of the Essential Work Orders continues. These Orders were introduced as an emergency measure during the war and applied to essential industries. Under these orders workers could not leave their employment nor could they be dismissed without the approval of the National Service Officer. The latest industry to be withdrawn from the Orders is that of shipbuilding and ship repairing, and withdrawal will take place at the end of the year. Thus in the new year ship-yard workers will be free to leave their existing employers and seek work elswhere.



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PRECISION MEASURING INSTRUMENTS

## New Method Of Measuring Visual Aptitude For Specific Jobs

A radical, but highly scientific stride forward in optical science is the Ortho-Rater. This modern instrument for measuring visual performance is revolutionizing employee selection and placement.

M ANY industries today are aware that the familiar wall chart eyetesting methods, similar to those employed by motor vehicle bureaus in "testing" the eyes of prospective automobile drivers, are inadequate for selection of people best qualified visually for any definite job. The Ortho-Rater is the answer to this problem. With it, an employer can select and place applicants whose eye "skills" meet the various visual requirements of a specific job.

For the past six years, Bausch & Lomb Optical Company and Purdue University have carried out extensive research of industrial vision requirements for scientifically determining the eye skills necessary for performing hundreds of jobs. Each job was analyzed and it was found that the patterns of visual requirements vary with each task. In other words, an individual may have a visual pattern entirely suitable for one job, but decidedly unsuitable for another.

The Ortho-Rater incorporates 12 of the visual performance tests which show definite relationship to job performance, safety and health. With comparatively simple charts, employees' visual performance is measured at far and near distances, created optically within the instrument, of 26 feet and 13 inches respectively. Tests for depth perception, acuity or sharpness of visual perception, eye muscle balances, and color, determines individual vision characteristics.

The tests are fun to take and include a series of checkerboards, lines crossing a flight of stairs, and arrows pointing to numbered dots. Doorknobs and colored circles appear in some of the tests. These symbols are used in place of the usual block letters found on eye charts, and are easily recognizable by anyone, regardless of nationality, education or ability to read.

Five close and seven distant tests are employed. This series measures the performance of each eye individually, as well as that of both eyes together.

Studies of the visual skills used in satisfactory performance of any given job were instrumental in establishing set visual requirements for the specific task. Imprinted on transparent charts known as visual job "profiles," the requirements are clearly marked out in squares—some red, some green, and some without color.

The individual's personal Ortho-Rater chart, when placed under the transparent profile, clearly indicates whether or not he has the eye skills suited to the specific requirements of the job. If the individual's visual diagram shown on his personal chart falls within the red and/or green areas of the profile.

he does not meet the job's visual requirements. Similarly, if his diagram conforms to the pattern of the colorless squares, his personal eye skills are considered suitable for the work.

However, while an individual may not measure up to the standards for a job as a machinist, his chart, when viewed under a profile for an inspector, may show him to be visually equipped to

become an expert inspector.

In short, eyes are neither "good" nor "bad." How "good" they are depends entirely upon what performance is required of them. A crane operator needs good depth perception and keen far vision, while a typist requires good near vision. Similarly, a lathe operator viewing his work at a distance of 25 inches may require different visual skills from an assembler holding work only 10 inches from the eyes.

In determining visual abilities through use of the Ortho-Rater, it was found that the uniform tests accurately iden-

tify:

 Employees and applicants whose visual performances are most suited to

specific jobs.

Those employees who are in need of professional eye care because their visual performances are inadequate for their present jobs.

 Certain jobs that need to be redesigned or supplemented with optical aids or better illumination because visual adjustments are so severe few persons can adapt themselves to them. Ortho-Rater tests are conducted in a few minutes' time, in most cases at or near employee's working stations. Ortho-Rater technicians, instructed at Purdue Industrial Vision Institute, in no way assume the status of a professional "eye men." They merely record findings and match them with visual requirements for specific jobs in various industries. Individuals whose vision is below standard for their jobs are so informed, with the suggestion that they see their own professional eye man for eye care.

In many industrial plants where the Ortho-Rater has been used to test visual performance, it is strikingly evident that professional eye care is needed by many employees on many jobs to a much greater degree than is suspected.

Among the companies using the Ortho-Rater today for measuring visual skills of their employees and applicants are The Perfect Circle Company, Sperry Gyroscope Corporation and Elgin Watch Company.

It has been found that a large percentage of those people tested, who met the visual standards established for their particular jobs, were able to earn and produce far more than those who did not meet the visual requirements. In addition, the quality of their work was considerably higher, while their accident rate was far below the job average.



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# PRECISION MEASUREMENT



By WARREN BAKER

## Section I — Inspection Instruments, concluded Part 6 — Electrical and Optical Comparators

IN THIS installment we shall consider the fourth variety of general inspection comparator, the electrical, and one special type, the optical.

The electrical comparator is used for the same purposes as the three mechanical types, discussed in Part 5. The electrical comparator has several features of special importance to the inspection laboratory. These will be gone into in detail here. The optical comparator has a number of special uses, principally in the measurement and comparison of special forms, which cannot be accomplished on any other device.

#### The Electrical Comparator

The electric comparator has neither levers, bearings, nor gears. The basic principle of this type of instrument is the Wheatstone bridge, the operation of which is based on the electrical imbalance that results when an armature is moved into or out of an electrical field. Because such movements, even very slight ones, can be picked up and magnified by induction and calibrated closely, the electric comparator can measure extremely fine dimensions. Having few moving parts, it is subject to little wear, save at the point of the spindle, which is easily replaced, or reshaped should it not wear uniformly.

Spindles are usually made of boron carbide, an exceedingly hard material, tungsten carbide, the hardest of the metals, or diamond. Boron carbide, hardest of all man-made materials, metallic or otherwise, is being used increasingly for various purposes in the precision field. Some of these will be considered in detail later.

Since a "zero" is always set up on the comparator to the nominal dimension desired for the particular operation, some slight wear at the spindle point has little bearing on measuring problems in any case.

Since the slightest motion of the spindle up or down unbalances a symmetrical inductance bridge, the height or depth of the movement is translated directly to a meter which serves as the dial of the instrument. Power variations from surges in the line cannot enter into the matter, because stabilizers are built into the instrument. Because there are no bearing surfaces in the gaging head, the spindle cannot bind, regardless of the measuring pressure used. The electric comparator to be studied here is provided with a variable measuring pressure control, giving the operator a pressure up to 21/2 pounds at his fingertips.

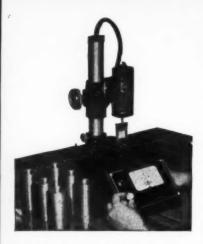


Fig. 1—Setting the electrical zero on the electric comparator.

#### Four Magnifications

The comparator shown in Fig. 1 has four ranges of magnification, from 100 to 1 to 100,000 to 1, depending upon the model. It is also possible to obtain this instrument with a four panel dial (Fig. 2) separate from the instrument itself, so that measurements may be read at a distance from the actual measuring point. Since each dial provides the operator with four magnifying ranges, depending upon the position of two switches, sixteen possible magnifications are provided.

The gage head is removable from the column (Fig. 3) and used for special measuring problems. It can be swiveled to any angle on the column, (Fig. 4) simplifying many difficult measuring problems, and can be rotated to any position about the column, (Fig. 5) measuring dimensions too large for the capacity of the comparator itself. Special long columns for exceptionally long work are available. (Fig. 6)

This comparator provides a range of magnifications from 5,000 to 1 up to 100,000 to 1, making possible the readings of dimensions in millionths of an inch directly without interpolation. Since the dial is four inches wide and each graduation on its face a tenth of an inch in width, the reading of units smaller than a micro-inch can readily be estimated. A tenth of a millionth is not difficult to estimate with the aid of a good glass, and quarters, halves, and thirds of a millionth are quite simple.

#### The Three-Ball Anvil

Another advantage of this instrument to the tool inspection laboratory is the multiplicity of accessories available for use with it (Fig. 7). Some of these are shown in use in this installment and others will be shown in Section II when discussion is had of various measuring problems which can be solved with the comparator. In the last installment were pictured two styles of three-ball anvils for comparators, and it may be well at this point to discuss some of the reasons for the use of such an accessory, the protruding type of which is shown on the machine in Fig. 8.

This writer once saw a test made of the ability of the user of a high-magnification comparator to obtain the same measurement readings on successive passes under the spindle, which was revealing, if not amazing. Executives of

Fig. 2-A four dial panel for the electric comparator.





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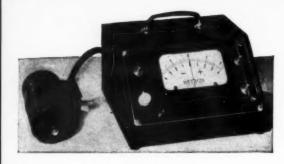


Fig. 3—Gage head and dial removed from comparator for special applications.

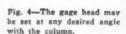
the manufacturing company, who were thoroughly familiar with the operation of comparators, but who were not particularly expert in its constant use, made the test.

A flat anvil, to which gage blocks could be wrung perfectly, was tried first. The two executives were able to get the same approximate reading in millionths of an inch only two times out of 10 with this anvil. The engineer who used the instrument constantly, got five

readings approximately the same.

A serrated anvil was next tried, to which the gage blocks may or may not have been wringable. Here the two executives were able to get no two readings alike, within a millionth of an inch, while the technician got two.

With the three ball anvil, in the use of which wringability did not enter as a factor, the executives were able to get three and four readings approximately the same, while the technician got six





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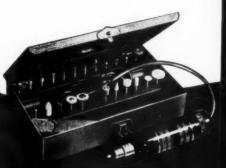
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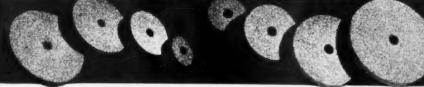
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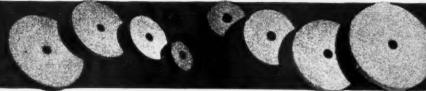
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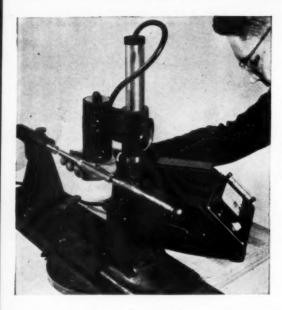


Fig. 5—Gage head may be swiveled around column to any position for special setups, such as this reamer inspection.

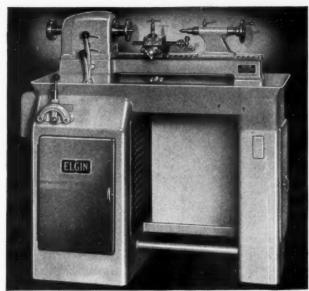
on one trial and seven the second time.

This proves several things: Wring to the anvil, if it enters into the matter at all, should be as near perfect as possible. In the measuring of any production item, however, besides gage blocks, no wring can be had in most cases; therefore none should be expected. Except for the production of high precision instruments themselves, production measurement to such extremely close limits will seldom be required.

Secondly, the demonstration proved that, in any measurement on the comparator involving the higher magnifications, several passes must be made under the spindle, the smallest usually being selected as the nearest to the true dimension. Never take fewer than five passes at such tolerances as a millionth of an inch, and 10 are much safer.

The selection of the smallest dimension as the true one is sometimes subject to question, too. It is assumed in the foregoing that size measurements will come last and that surface finish and accuracy have already been established. Otherwise it is best to take the two or three smallest dimensions out of the 10 passes, and average them. If one were to get one small dimension, several millionths of an inch less than the next nearest two or three in 10 passes, he would be forced to conclude that the surface finish was at fault or that the surfaces of the part under inspection were not parallel. Likewise, it is necessary to let the part under inspection cool thoroly between passes, if held in the fingers, because even a few seconds of exposure to the heat of the body can make a steel part grow several micro-inches.

Thus, many variables enter into



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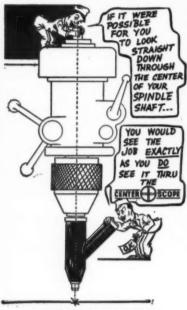
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Fig. 6-Special long column for increased capacity.

measurement at these exceedingly close tolerances. Unless the conditions surrounding the work are kept always the same and certain precautionary techniques are used always, no operator can ever be sure of getting the same measurement twice regardless of the instrument or the accessories used with it.

Neither the three-ball anvil nor any other accessory can make up for careless techniques by the operator. However, since entrapped air, dust, or even grease may sometimes throw far and wide the results where wring to the anvil is depended upon, the use of the three-ball anvil for fine measurements



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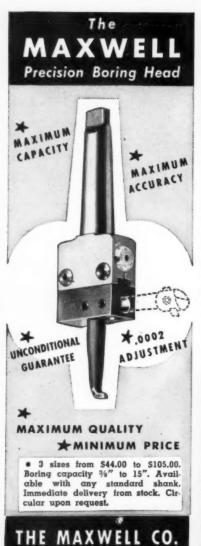
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Fig. 7—A complete kit of comparator accessories.

can at least obviate this nuisance.

A spindle lifter shown in Fig. 9 also is a much used accessory in the inspection laboratory for close tolerance work. By its use the part can be placed on the anvil with the spindle lifted out of the way, then the spindle brought down to the part and the measurement read at any point on the surface. This obviates the sliding of the part under the spindle, thus perhaps upsetting wring, and also obviates at least some of the variables that may be encountered as the result of surface finish. A self-

Fig. 8-The protruding three-ball anvil in place.





important feature of adaptability can be also demonstrated.

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shown here is normally used to build our standard Openside Planers. However, this basic Rockford Hy-Draulic design may also be applied to special machine design, such as to the grinder shown below. Whether the machine is built as a planer or a grinder, the same desirable operating advantages inherent in Hy-Draulic design are obtained.

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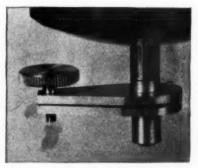
Fig. 9—Spindle lifter for high precision work. aligning flat spindle tip, Fig. 10, makes easier the measurement of rounded parts.

#### Operation of the Comparator

In Fig. 11 is a photo-diagram of an electric comparator with the names of all the essential parts and controls labeled in. Before going into the essential features of the operation of the comparator, it may be well to give first some of the special techniques that should always be adhered to in connection with its use.

1. Use the comparator only with speci-

Fig. 10-Flat spindle for measuring rounded objects.



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TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

Superfinished

fied current, usually 110-115 v. 60 cycle a.-c. altho' certain makes and special types are available for use with other power sources.

2. Keep the anvil, whatever type, always clean. Oil, or coat with plain petrolatum (never the phenol variety) when not in use. Never place rough or gritty parts on an anvil, this reduces precision.

Keep the screws on the column clamp tight enough to prevent accidental dropping of the gaging head onto the anvil or the work.

4. Loosen and tighten the spindle tip only with the fingers.

5. Loosen the thumb screw on the bottom of the column before trying to swivel the gage head about the column.

6. Select the smallest range (i. e. the largest magnification) that will cover the tolerances. This will avoid making many hairline readings and estimates.

7. For high precision work, always turn the comparator on and let warm for at least half an hour before using.

8. Never breathe heavily on the instrument's anvil, spindle or on the part under measurement while readings are being made. This is not necessary because the dial is placed below the anvil and at the same distance from the eye.

To prepare for any job of measurement on the comparator, first set the spindle pressure for the material on which you will be working. The softer the material, the less spindle pressure should be used. A modified Moh's scale is given in Table I, making it possible to compare the hardness of the material under test with those shown, so that the required spindle pressure can be estimated. Plastics, felt, paper, aluminum, and lead take a pressure of about 4 ounces. Pressures then range up to 2½ pounds hardened steel parts, plug gages, gage blocks, boron carbide faces or inserts, tungsten carbide materials. etc. Higher pressures harder materials are essential to make sure that oil films on the surfaces to be measured will be broken.

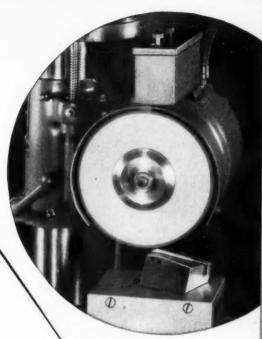
Next, select the range of your work. Observe a plastic guard over the range switches on the comparator pictured; this prevents accidental changes of the switch positions by a shirt or jacket cuff. Here are the ranges for each switch setting for the laboratory model instrument:

Both switches up: magnification is 100,000 to 1, full range is plus or minus 0.00002"; reading is 0.000001" per graduation. Bottom switch up, top switch

#### COMPARISON OF VARIOUS HARDNESS SCALES

Moh's Hardness Scale	Mineral	Carborundum Number	Indentation Number	Rockwell Hardness	
1	Talc	1			
2	Gypsum	2	32		
3	Celcite	3	135	74 Rp	
4	Fluorite	4	163	84 Ra	
6	Apetite	5	360-430	39-45 R.	
	Feldspar	6	540	56 R.   Range of	
3	Quertz	7	710-790	61-64 R. Steel Teat	
	Topes	8	1250	72 R.	
	Sapphire	9	1445	75 R.	
	Fused Alumina	10	1635	77 R.	
	Tungsten Carbide	10 12 14	1850	80 R <sub>a</sub>	
	Silicon Carbide	14	2150	84 R.	
	Boron Carbide (Norton)	19.7	2250	85 R.	
	Carbonado )	36.4	8700		
	Congo (Gray)	37.8	8275		
	Congo (Yellow) (Diamond)	41.0	8450	1	
10	Brazil Ballas	42.0	8500	i	

Table I-Comparison of Various Hardness Scales.



TOOL BIT GRINDER



## FAST ACCURATE EASY TO OPERATE

The Sellers 3T-a modern Carbide Tool Bit Grinder, equipped with diamond wheel, produces keen cutting edges on milling cutter tool bits and screwed-on tool blanks. Write today for full specifications!

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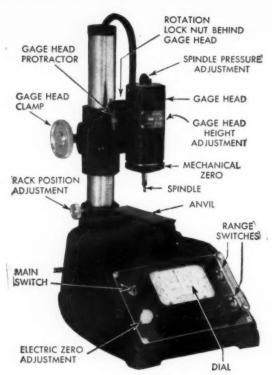


Fig. 11.

down: magnification is 50,000, range is plus or minus 0.00004", and reading per graduation is 0.000002". Top switch up and bottom switch down: magnification is 10,000, range is plus or minus 0.0002", and reading per graduation is 0.00001". Both switches down: magnification is 5,000, range is plus or minus 0.0004" and reading per graduation is 0.00002".

There is a lock nut behind the gage head, the loosening of which will make it possible to move the gage head to any angle with the column. Loosening the gage head clamp and the rack position adjustment allows turning of the gage head to any position around the column and raising of the rack for greater capacity.

#### Procedure for Use.

Whether the work is on the anvil or located somewhere else, the procedure from this point is the same.

Loosen the gage head clamp and, with the gage head height adjustment, bring the gage head down to the work until



Mailings have already been made on this new 24-page catalog describing JESSOP'S "Malta" carbide and "T & V" cast alloy tools, dies, and wear resisting parts. Due to constant personnel changes in industry, however, we may have failed to send you your copy. If this is the case, just ask for a copy on your company letterhead and it will be mailed to you at once. Please include your title.

# JESSOP STEEL Company





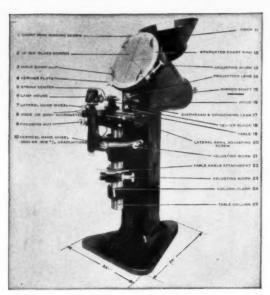


Fig. 12.

the needle moves toward the right side of the dial. Lock the adjustment for height and set the needle as near zero as possible with the mechanical zero adjusting ring. Finish the zero adjustment with the electric adjustment knob. Slide the reference stack in and out under the spindle several times, wringing it carefully to the anvil each time if the anvil is of the variety that requires wring, to see that minimum dimension is set up.

The comparator is now set to a nominal, or "zero", dimension. If there is any later change in zero adjustments, pressure adjustment, or condition of humidity or temperature, the instrument will have to be reset to zero.

When work is placed under the spindle, if less than the zero dimension set up, the needle will drop off to the left. If greater than the dimension desired the needle will travel to the right. No harm will be done to the comparator

if left in the "on" position for hours, or even overnight. If left on for long periods between times of use, it is better to keep the needle away from the stops at either end by placing a part within the range set up under the spindle. It is not necessary to shut off the power when changing range switches. A zero reset will be necessary after any such change.

### The Optical Comparator

The Jones & Lamson optical comparator is both a projection comparator and a measuring machine, in the latter case operating on somewhat the same principles as the toolmaker's microscope described in Part 4. Instead of viewing the object in the eyepiece of the microscope, however, the shadow of the object, with the optical comparator, is projected to a ground glass screen and may be magnified there to any of a number of sizes, depending upon the

# Versatility beyond Comparison



# ...in Cutting Face Gears

Both "on center" and "off-set" face gears are accurately and economically produced on the 7-Type Fellows High-Speed Gear Shaper through the use of a standardized special attachment.



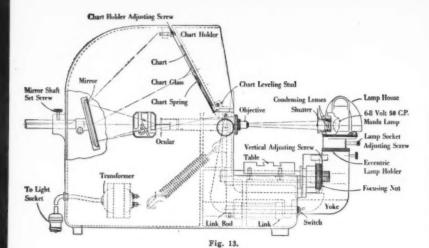
# and Mating Spur Pinions

An every day job for the same standard Gear Shaper is the mating spur pinion . . . A simple cutter change starts it humming on many unusual parts such as splines, cams and irregular shapes.

★The "Art of Generating With A Reciprocating Tool" dramatically shows how the Gear Shaper is a sound investment for every shop that produces high-quality gears.



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model of the comparator and the size of the object, ranging from 5 to 125 power.

ARTUS ARBOR SPACERS
The COLOR tells
the THICKNESS



ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

CONVENIENT TRIAL OFFER Handy Spacer Assortment

10 ea. .001 — .0125 thick 5 ea. .015 — .030 thick

100 SPACERS IN ALL " — \$2.80 11/4" — \$3.40

%" — \$2.80 1½" — \$3.40 1½" — 4.20 Other standard sizes also available.

Illustrated Folder Free. Immediate Delivery on Spacers, Gaskets, Shims

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In Fig. 12 is shown a photo-diagram of the pedestal type machine, with all parts and controls labeled in. Bench type machines also are available for the inspection and measurement of parts made in large quantities, by comparison with a master template or drawn chart, one of which is shown in schematic view in Fig. 13. The principle of the machine is the same in both cases: the light from the lamp passes thru condensing lenses, across the object, thru a lens system, and the enlarged image is then projected to a mirror and thence to the screen or chart.

Lens systems allowing several different magnifications are supplied with each comparator, but these lens systems are not interchangeable between comparators without adjustment of the mirror.

The table on which the object to be



ROUBLE-FREE tapping for you is more than a wish with Ettco-Emrick Attachments. These high-speed, hair-trigger sensitive tappers in the spindles of your drill presses will give you fast, accurate tapping — with maximum protection against tap breakage and work spoilage — and at a very modest tool cost. They come in seven sizes for No. 0 to 1" taps. Bulletin No. 2 will give you details. Write for a copy.

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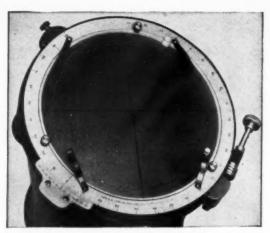


Fig. 14-View screen, showing vernier, left, and control worm, right.

measured or compared is staged, is movable both laterally and vertically, held in constant tension laterally by weights. Provided is a lateral hand wheel together with a lateral micrometer adjustment of either 0.0001" or 0.0005", as the purchaser prefers; and a vertical adjusting wheel which also is graduated in stages of 0.0001". Metric graduated machines are also available.

In addition to the micrometer, a V-trough along the front of the table, in line with the micrometer, accommodates gage blocks or measuring bars. The gage blocks are used for measuring even inches and the micrometer for measuring fractions of an inch. The table is held against the micrometer or gage block by the tension weight.

When using gage blocks or other measuring bars in the V-trough for direct measurements, the micrometer should be set at zero. If the tolerance allowed is less than plus or minus 0.0001", all measurements should be made by gage blocks by the same methods as considered heretofore, the

micrometer being disregarded in that case.

No attempt will be made here to go into full detail as to the method of setting up and checking lenses and magnifications, mirror adjustments, adjustments of light beam and screen, and all the rest, which are manifold, because very complete instructions covering all these points come with each machine. Certain of these points will come under scrutiny in Section II in the discussions on the inspection of inspection instruments themselves. At this point only the two general uses of the machine, measurement and comparison, will be considered.

### **Direct Measurement**

For direct measurement of an object, it is necessary simply to stage the object on the table, in proper focus before the projection lens, so that the shadow of one side corresponds with the vertical line in the screen; then move the table laterally until the shadow of the other side corresponds with the line, and read the distance moved as shown by the inserted or removed gage blocks or the

# THE HARTFORD

Super Spacer







UNEXCELLED ON ACCURATE INDEXING OPERATIONS

The Super Spacer is a tried and proven tool . . . readily adaptable for milling, drilling, grinding, tig boring and slotting. It is a versatile production aid of exceptional value in accurate indexing operations—with feeds and speeds limited only by the capacity of the holding means and power of the machine. Write today for full details.

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# NUMBERALL

# Multi-Wheel Numbering Machine Model 70



Model No. 70

The most efficient method of stamping numbers into metal. Reneats the same numbers until changed. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from

Write for Bulletin BB-70.

### Automatic Indenting Numbering Head Model 50

3 to 20.

Automatic indenting numbering head for consecutive or repeat numbering. 1/32" up to \%" high figures can be furnished in sharp face Gothic or shaded Roman figures. Prefix or suffix letter wheels. Bench, foot, or power presses can be used.



HUGUENOT PARK STATEN ISLAND 12 N. 1



Fig. 15—Table height is regulated by micrometric elevating wheel.

micrometer, or both. This procedure is the same as that detailed in connection with the toolmaker's microscope.

With the pedestal type machine, vertical and angular measurements can also be made. Vertical measurements can be made up to 4 inches and angle measurements are read from the vernier on the chart ring to an accuracy of 1 minute, Fig. 14. Attachments are also available for compounding the table. Vertical travel of the table is read from the micrometer graduations on the control wheel, Fig. 15.

Operation is much the same as that in measurement of lateral dimensions. The shadow of the top of the object is made to coincide with the horizontal line on the screen, then the table is moved upward until the shadow of the bottom of the object coincides with the horizontal line: the distance is read from the micrometer wheel. This procedure may be reversed, if desired. For comparison inspection it is necessary to make up a chart, showing magnified outlines with given tolerances of the object to be inspected. The object then may be staged on the table and compared directly with the master drawing as to dimension, form, angle, lead, or any other points that may be required. These matters will be gone into in greater detail in

### "Dyne-Mite" ELECTRIC SCREW DRIVER

Meters: Universal for D.C. or A.C. 25 to 60 cycles

Capacities: Wood screws up to 1½", machine screws from No. 2 to No. 10

Clutch: New "Adjustomatic" selective torque

Gears: Heat-treated chrome nickel steel

**Ball Bearings: Throughout** 

Switches: Patented quick make and break with quick releasing lock



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Millers Falls "Dyno-Mite" Screw Drivers and Nut Runners are small but powerful, light but efficient electric tools serving industry well in the current production battle. Their greater load capacity, higher efficiency, and greatly lengthened clutch life add up to greater output for industry—for you.

We have yet to see a mass assembly job that couldn't be done better with a Millers Falls Electric Screw Driver. Write for information.



### No. 50 - BALL BEARING SCREW DRIVER

Motor: Universal for D.C. or A.C. 25 or 60 cycles

Capacities: Wood screws from No. 2 to No. 10—1½", machine screws up to No. 12

Bearings: Ball bearing Armature and Spindle

Clutch: Patented "Adjustomatic" with smooth vibrationless action

Switches: Operated by slight turn of nickel plated cap; hand or foot control, for fixed bench operation

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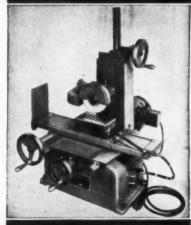
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MACHINE TOOL BLUE BOOK

217

# SANFORD



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ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

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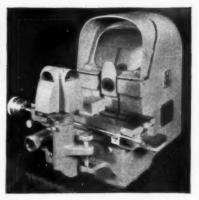


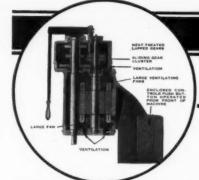
Fig. 16—Bench type projection comparator with test pin in position to test magnification or set up a direct measurement chart,

considering actual measuring problems in Section II.

For positioning the holding fixture in proper relation to the projection lens and screen outline, it is desirable to stage a master piece and to adjust the shadow of this piece to the outline, then replace the master with the parts to be inspected, to see if their shadow coincides with the outline on the screen.

Photographs courtesy the DoAll Company and Jones & Lamson Machine Company.





FEATURE No. 2

# THE **Civey** TYPE MA-6 AVEY-MATIC POWER FED HAND FEED AND REVERSING MOTOR TAPPING MACHINE

features motor and gear box construction of six speed machine

Motor mounted directly back of spindle with gearing between motor and spindle drive sleeve. Two speed motor, three speed transmission. Only one pair of gears in mesh at any spindle speed. Motor and spindle drive mounted on ball bearings, fan ventilated motor.

> Type MA-6 is made in following capacities: No. 2 - 1/8" capacity in cast iron. No. 3 - 11/4" capacity in cast iron.

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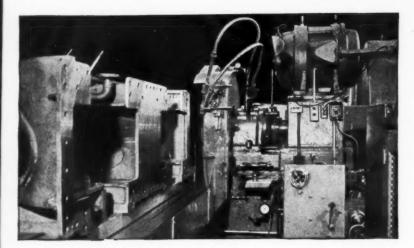


TYPE MA-6 . COMBINATION MACHINE

1st Spindle - Avey-matic Feed 2nd Spindle - Hand Feed







# "Bridgeport" Does a Precision Job In Heroic Dimensions!

THESE were steel castings for a gigantic marine speed reducer. The job was to finish-grind the flange faces ready for assembling. The joints had to be absolutely oiltight!

It was done in one operation on a "Bridgeport" Face Grinder to .005 tolerance, two sides, in about 11/2 hours — a sharp reduction in the time required by any other metalremoving technique. To insure cool, clean cutting, the famous

"Bridgeport" Sectional Grinding Wheel — composed of individual abrasive segments mounted in a cast steel chuck — was used.

This is but one of innumerable instances where "Bridgeport" face grinding has excelled in producing flat surfaces. "Bridgeport" Face Grinders include table sizes up to 240" x 54" and wheels up to 60" in diameter. Describe your metalremoving problem. We'll help you to solve it.

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# Bridgeport





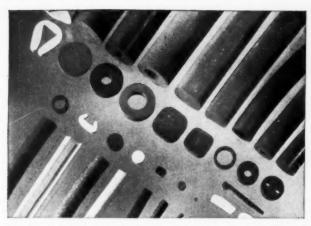


Fig. 1—A collection of gaskets, extruded tubes, rods and fabricated stock made out of G-E silicone rubber.

# New Silicone Rubber Has Many Industrial Applications

INCREASING use is being made of G-E silicon rubber for industrial products demanding a material that will withstand a wide range of operating temperatures. Used primarily as gaskets for searchlights, superchargers and other electrical equipment in extruded form during the war years, the silicone material is not only being more widely

applied in those fields but is finding comparatively extensive use in air craft, heat - sealing equipment, various types of lighting equipment, baking ovens, diesel engines, vacuum systems etc., in both the extruded and molded forms.

Preliminary tests have indicated that ice has less tendency to stick to silicone rubber than to other rubber stocks. This characteristic and the excellent heat resistance of silicone rubber to hot air suggests its use in de-icing equipment on planes. It is also expected that the need for such a material will increase as the skin temperatures of high speed

Heat, chemical, moisture resistant qualities are discussed. Silicone rubber is used in aircraft, refrigeration, lighting, baking and other industries as gaskets, seals and press pads.

# Save Time





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### TYPE A-STEP JAW DESIGN

Size No.	Range of Bores Taken	Length Overall
1A	1/2" to 1"	9"
2A 3A	1" to 11/2"	121/4"
4A	2" to 3"	201/2"
5A	3" to 4"	21"

### TYPE B-STRAIGHT JAW DESIGN

Size No.	Range of Bores Taken	Length Overall		
1X	1/2" to 18"	5"		
2X 3Y	21/32" to 21/32"	6"		
00	3/4" to 7/8"	81/4"		
0	7/8" to 1"	81/4"		
1 2	1" to 11/4"	1136"		
3	1,8" to 2"	133/4"		
4	2" to 21/2"	171/4"		

(Other sizes taking up to 7" bores.)

W. H. NICHOLSON & CO. 117 Oregon St., Wilkes-Barre, Pa.

planes increase due to air frictional effects.

Silicone rubber possesses heat resistance to a degree that it remains practically unaffected when subjected to temperatures ranging from minus 55F to 520F. It is highly chemical and moisture resistant, provides excellent electrical insulation and will not adhere to metals or other materials at high temperatures which is an important feature when applied as gasketing material.

Silicone rubber withstood continuous use in searchlights at 340 F as compared to a generally accepted maximum of 220 F for most synthetic and natural rubber formulations. Severe tests in which silicone rubber aged for one year in a hot, dry circulating oven for one year did not appreciably change the surface hardness or flexibility of the material. At a temperature of 400 F, the silicone material remained flexible and

Fig. 2-Gasket used in aircraft supercharger where high temperature resistance and low temperature flexibility was reguired for the extreme service conditions encountered.



# Puts the PRECISE



Spindle Taper Runout:

in Precision

Allowable Error	.00013
Spindle Runout on 8"	Mandrel:
Allowable Error	.001" F.I.R.
Parallelism of Spindle	to Table:
With Error at	
Spindle Nose	.0000"
Allowable Error 8" f	rom
Spindle Nose	0005"
Parallelism of Spindle	e to

Top of Knee:
Allowable Error
Right Angularity of Table
to Spindle on 20" TRAM:
Allowable Error
.001"

Squareness of Head Slide to Top of Knee: Allowable Error .0005

Parallelism of Head & Knee Slides on Column, PLANE A: Allowable Error .0005" Squareness of Head Slide

to Top of Saddle:

Allowable Error .001"
Parallelism of Head & Knee
Slides on Column, PLANE B:
Allowable Error .0005"

Every Nichols Miller is shipped with an inspection sheet showing .001" these tolerances or better.



Everything about the Nichols Miller has been done to make it as precise as precision can be. Built-in Accuracy... Rigidity... Speed — all are there ready to give you speed with precision on a single piece or in mass quantity — with Versatility limited only by the imagination of the tool engineer or the capacity of the machine itself.

### CONDENSED SPECIFICATIONS

COMPENSED STEELITICAL	IONS
Table Working Surface	634" x 21" or 3
Longitudinal Travel (screw or lever)	10" or 19"
Transverse Travel (screw or lever)	7"
Vertical Travel — Knee	131/2"
Rise and Fall of Spindle	41/2"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

### √ RIGIDITY

Carefully designed, uniformwalled, box-type castings take full advantage of cast iron's strength.

### VERSATILITY

A "basic" machine easily tooled to handle tool room or production milling within its capacity. Mounting the work in the spindle permits Second Operation boring and facing.

### √ SPEED

For example, the Nichols Miller can turn out 1000 cuts an hour on one setup. Then, after a quick tool change, it can be ready for another job.



Send for your free copy of "The Miller That Uses Its Head"

# THE Nichols MILLER

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NATIONAL DISTRIBUTORS, NICHOLS-MORRIS CORP., 42-A CHURCH ST., NEW YORK 7, N. Y.



Fig. 3—In pressing sheet mica, silicone rubber provides a soft, resilient pad that insures an even bond over the entire sheet. The pad is reinforced with layers of asbestos cloth for greater strength.

resilient for several months and at 500 F for several days.

Silicone rubber parts are now being used in many large aircraft as gaskets in powerful new radial engine motors and in jet engines and also is being incorporated in a new type of oil seal which operates around high speed shafts at temperatures of 350 to 400 F. The outstanding heat resistance of the material also suggests its use in hot air de-icing systems, heating ducts and other places in the planes where high temperatures are encountered.

In high vacuum systems, G-E engineers said that silicone rubber gaskets do not harden and crack due to the escape of volatile plasticizing components at elevated temperatures because of the absence of any plasticizing oils in the formulations. The gaskets maintain uniform surface hardness and flexibility over a wide range of tempera-

tures. There is less breakage of glass equipment occurring from expansion and contraction when silicone rubber is used between glass and metal at high temperatures. For this application, the silicone product also gives greater protection against leakage because stocks do not harden and less pressure is necessary with the softer stocks to obtain a good seal.

One of the increasing uses for silicone rubber is as gasket in high temperature equipment such as diesel engines, gas turbines, air compressors and other equipment where natural and synthetic rubbers cannot withstand the high operating temperatures and have too high permanent set characteristics. In the new diesel electric locomotive, silicone rubber gaskets are used between the supercharger and diesel engine block where a soft, resilient stock is re-

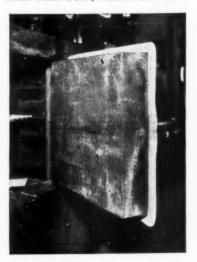


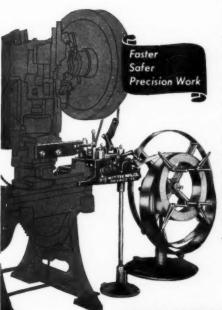
Fig. 4—Gaskets of silicone rubber used in high temperature baking ovens. Material will withstand continuous operation at temperature as high as 340 F and baking temperatures up to 500 F.

# Planning Peacetime Production Using Coiled Strip Stock?

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# **Automatic Roll Feeds and Reel Stands**



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

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ROLL FEEDS
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REEL STANDS

quired to give positive gasketing action at 300 F and 15 pounds air pressure. It was stated that the heat resistance of the silicone material results in few replacements of gaskets and reduces time lost due to repairs.

Another novel use of silicone rubber is as a press pad in heat sealing equipment where it stands continued exposure at 300-350 F with no noticeable change in flexibility or surface hardness and will not adhere to plastics, glass, cloth, metal and other materials used in packaging. A similar use is in the pressing of sheet mica where silicone rubber is laminated with layers of asbestos cloth to provide a pressing pad that insures an even bond over the entire sheet.

The silicone material is receiving additional use in the lighting field as gaskets for floodlights, searchlights, explosion-proof lamps, hospital operating lamps and infra-red baking equipment.

In such applications, the use of silicone rubber reduces possible breakage of the lens because of its resiliency at high temperatures and likewise reduces maintenance problems due to the fact that no volatile components which coat the lens are given off at high temperatures. Silicone gaskets often times eliminate expensive cooling vanes and other design considerations given to reduce temperatures. High intensities of light do not promote surface oxidation and cracking and, when relatively high concentrations of ozone are present, stability is excellent.

For high temperature baking ovens, silicone rubber gaskets result in a less frequent shutdown of baking equipment; less entry of air or leakage of hot air because of the uniformity of the material at varying temperatures; and less necessity for close tolerances to be held on the doors of large ovens because of the soft stocks available. The non-adhering properties of the silicone also is advantageous for this use because a door gasket would not stick to the oven and tear when the door was opened.

The use of silicone rubber in home lighting fixtures and as gaskets for refrigerators is being investigated, because there appears to be no tendency for the silicone rubber to stain the metal or wooden parts with which it comes in contact.

Silicone rubber is available in extruded shapes, molded parts, sheet stock or fabricated stocks. Extruded rubber is available in rods, tubes, flat strips or a large variety of desired shapes for which a die may be formed. Sheet stock is available in thicknesses from 1/32 in. to ¾ in. and also may be reinforced with plies of glass and asbestos cloth to give greater strength. Molded parts can be made in any of the conventional types of compression molds and are now being produced in increasingly intricate shapes.



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Timken roller or ball bearings to spindle



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radii, o to 1½".
Angular travel,
1½". Wheel capactravel,
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# Basic Requirements of Lubricating Oil Maintenance

By

WALTER C. BAUER, M. E.\*

Consulting Engineer, Briggs Clarifier Co., Washington, D. C.

According to Mr. Bauer, lube oil maintenance is necessary in all internal combustion engines. In this article he explains the value of continuously maintaining oil in prime condition in engines - - - keeping oil clean and free of contaminants as it flows through bearings and other moving parts, as against the system of draining and flushing the crank case.

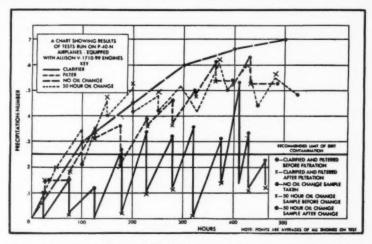


Fig. 1. The naptha insoluble contamination build-up in aviation engine oils under four different operating conditions.

The conscientious operator of any precision built machine is vitally concerned with its operation and, as efficient operation usually depends on the satisfactory lubrication of its moving parts, equally concerned with the qual-

ity of the lubricant being used. The operator's entire concern with lubrication can be summed up in just one quality of the lubricant—"lubricity". Webster defines "lubricity" as "smoothness, also that property that diminishes

friction," with a hundred percent lubricity there would be no friction; no friction—no wear; no friction—no heating; no friction—no problems of lubrication and no problems of oil maintenance. Unfortunately there is no lubricant with 100% lubricity, nor is there a standard for the measurement of

No Clarification

(50-hour oil change).

The designer of the machine or engine calls on his past experience and/or on a series of tests of the completed unit and determines the lubricant that, to his best judgment, gives the best overall performance. Limiting specifications of viscosity, viscosity index, flash, fire, pour point, Conradson Carbon, and pos-

RESULTS OF TESTS RUN BY A. A. F. ON P-40-N AIRPLANES EQUIPPED WITH ALLISON V-1710-99 ENGINES						
	Total Hours	Total Fuel Consumed, Gals.		Consumed,	Oil	
Clarified No Oil Change		189,443	49.75	3,196	.839	
Filtered No Oil Change	4133:10	206,539	49.97	3,936	.952	
No Clarification No Oil Change	3187:00	161,122	50.55	3,448	1.081	

COMPARISON OF FILE AND OIL CONSUMPTION

50-Hour Oil Change 3205:30 171,395 53.46 4,704 1.467
This comparison reveals a definite advantage on fuel and oil consumption with Clarifical (No oil change) versus Filtered (No oil change), No Clarification (No oil change) and No Clarification

	Total Hours	Fuel GPH	Total Fuel Consumed, Gallons	Oil	Total Oil Consumed, Overts	Savings	Savings	
Clarified No Oil Change	14333:15	49.75	713,079					
Filtered No Oil Change No Clarification		49.97	716,233	.952	13,655	50,023	7,392	

No Cil Change 14333:15 50.55 724,546 1.081 15,494 21,710 5,533 (Oil Added) No Clarification

50-Hour Oil Change 14333:15 53.46 766,256 1.467 21,027 0

The table above shows the amount of fuel and oil saving had each group of aircraft flown an equal number of hours. (Based on 50-hour oil change as reference.)

Fig. 2. The effect of contamination in the oil on engine operation.

"lubricity"; there is no approved A.S. T.M. method to even approximate a comparative value of this quality in different lubricants. Lubricating oil is sold and purchased and used for its "lubricity" value, and with no standard measurement of this primary value available.

sibly oxidation stability for the oil are written and issued to the ultimate user of the machine for his guidance in securing the correct lubricant. If the machine or engine is not in to the high output, highly stressed class this recommendation may be reduced to merely an S.A.E. number. Again, and this is cur-

rent practice in the Diesel Engine field. the engine builder surveys the oil market, determines which oils by "brand" name meet the limiting specs and issues this "approved oil" list to the operator. In the aviation engine field, which is nearly the top in high output, highly stressed machines, the quality specifications as given are usually issued to the operator. The engine or machine builder has conducted his research to determine these lubricant specifications on new oil, i.e., on comparatively new machines usually and under nearly ideal operating conditions. The user of the apparatus, if he is going to maintain the machine at its rated output, then must have means to maintain the oil as closely as possible to its original or basic condition.

To illustrate better the effects of both non-maintenance of the oil and partial maintenance Figure 1 shows the naptha insoluble contamination buildup in aviation engine oils under four different operating conditions. The first condition was complete clarification every 25 hours operation; the second was filtering for removal of dirt only every 25 hours; the third was oil change every 50 hours of operation; and fourth was operation without any effort to maintain the oil other than the addition of new oil as needed.

The effect of this contamination in the oil on engine operation is illustrated in Figure II. Since these engines were all operating in the same type aircraft and on parallel missions, the differences in fuel and lube oil consumption can only arise from the difference in lubricating oil condition. It can be noted from the curves and charts that fuel and lube consumption figures do not exactly coincide with the proportion of physical contamination present.

From the results of the tests given, it is obvious that lubricating oil mainte-





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ments, aviation, communications and similar work.

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H. B. ROUSE AND COMPANY 2216 N. Wayne Ave. Chicago 14, III. nance is more than the removal of visible dirt. The engines that were just filtered and not clarified gave oil that was very little cleaner than that secured by 50 hour oil changes, but this filtering did succeed in maintaining the oil closer to its original viscosity than did the oil change method—and a lower overall fuel consumption. The "clarified" oil, where provision was made to remove soluble contaminants as well as solids gave the best overall picture.

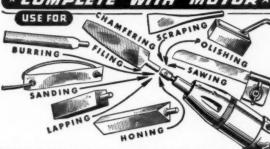
The maintenance of the lubricant in different types of machinery each present different problems, though the type of oil used may be the same. Paper calender rolls, steel rolling mills, steam turbines, gear speed reducers, diesel engines, and spark ignition engines, all contaminate the oil differently and require variable oil maintenance equipment, though basically the requirements are the same:—to maintain the oil as closely to the new oil specifications as possible.

The spark ignited internal combustion engine combines all possible forms of lubricant contamination in its operation. Dust from the air enters both thru the air intake to the carburetor and thru the crankcase breathing system. The piston rings are never a perfect seal against the cylinder walls and products of combustion - carbon particles, lead oxide particles, water vapor-enter the crankcase; the under sides of the pistons are hot enough to partially "crack" some of the oil coming in contact with them; the oil throw-off from the crank-pins is finely enough atomized to aeriate and oxidize; and the results of improper lubrication are quickly evident to the operator. To maintain the oil in this engine in prime condition all of these contaminants should be removed as formed.

By analyzing the results of many years research the reasonably safe limits for both the physical and chemical con-

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# CONTAMINATION LIMITS LUBRICATING OIL - INTERNAL COM. ENGINE

Physical (Dire)

Particle Size Max. 10 Microns. (.00039)

Precipitation No. .05

Chamical

Neutralization Ng. .3 (?)

Asphaltines ?

Dilution

Water Trace

Fuel 15%

Fig. 3. Tabulation of the reasonably safe limits for both the physical and chemical contamination of the oil in an internal combustion engine.

tamination of the oil in an internal combustion engine have been established. These are tabulated in Figure III. The basic problem then, in lube oil maintenance, for this particular application, is to apply the mechanism to keep the oil from contaminating past these limits.

There are three ways of accomplishing this result:

First: Drainage and recharge with new oil.

Second: Drainage and batch reclamation.

Third Continuous clarification.

The first method, drainage and recharge with new oil, is the method usually employed, and is the one that has been very adequately "sold" to the operators by the oil companies. "Five hundred mile oil changes" for pleasure cars is standard practice. Most good oils will go 500 miles in a car that is in fair condition and still not be too far from the limits given, provided: one, it did not make too many stops and starts—(cool-offs and warms ups); did not travel too fast, did not lug over too many mountains, or the road was not too dusty. On the other hand 500 miles is about the distance to build up limit contamination if the car were driven at consistantly reasonable speeds over smooth clean level roads, and with very few stops. As a top figure, though, 500 miles is good.

On most Diesel engines it would only be very few hours (2 to 6) for the physical (dirt) limit to be reached. On natural gas engines it takes from 50 to 200 hours—then the limit would be chemical contamination (neut. number). In aviation engines the contamination limit is apparently reached in between

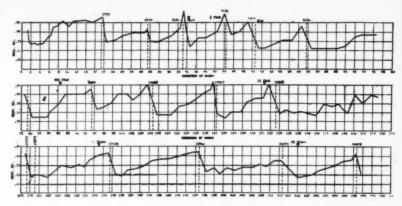


Fig. 4. Lube oil maintenance in a 300 H.P. natural gas engine used in water pumping service.

10 and 15 hours. Oil changing at 50 hour periods in aviation engines is not at all effective because of the impossibility of completely draining the system without taking the oil plumbing system

almost completely apart. Not more than 60% of the oil in fighter planes is changed when only the oil reservoir is drained and refilled.

Without constant laboratory checks



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as to oil condition periodic oil draining and refilling with new oil is not the answer to reasonably certain and safe lubrication maintenance. In an effort to be safe in their lubrication practice some operators make it a practice to make very frequent oil drainages (150 to 200 miles in trucks); clean and recondition this oil in batches and return it to the engine. This practice again requires strict laboratory control, not, however, to check the oil in the engine but to check each batch drained and to prescribe the needed treatment to restore the oil to specification. The ultimate result of this method of lubrication maintenance is apt to be better than that obtained by the more extended operation between drainings and with the overall lubrication cost at least equal.

Continuous oil maintenance can only be successfully accomplished when each individual machine has its own oil maintenance equipment. To do the job

with the minimum operational expense and with least service attention these units cannot be too small. Space limitation on mobile equipment and weight limitations on aircraft seriously limit the extent to which proper size units can be used in this service. In stationary practice the results achieved have been very gratifying. Chart IV gives the picture of lube oil maintenance in a 300 hp natural gas engine used in water pumping service. This chart covers 27 .-800 hours of engine operation, or the equivalent of three years, 2 months and 3 days continuous operation-and without oil change. This continuous use of oil in an engine is meaningless without also recording the maintenance record of the engine itself before and after installing the oil maintenance equipment. The following is typical from log book entries before the installation was made:

"August 7—No. 4 engine—1,271 hours of running. All pistons had varnish removed; all rings removed; pistons cleaned; sump cleaned; 15 rings stuck; 5 rings replaced." "September 16—No. 1 engine—1049 hours of running. All pistons had varnish removed; all rings removed; pistons cleaned; sump cleaned; 15 rings stuck; 5 rings replaced."

Years later the following notes were made in the log book;

"December 22—No. 4 engine 20,320 hours of running. Pulled No. 1, No. 3, No. 6 pistons. All rings free, no deposits on pistons or in crankcase." "March 9—No. 4 engine—34,122 hours on oil. All rings free, carbon light, 3058 hours since pistons pulled for inspection."

To prove this is not an isolated case the following is the record from the diesel powered ferry "The Governor Harry W. Nice":

The main engine in this boat gives an even better operational record than that recorded in the Clark Natural Gas engines. Chart V gives the picture of oil condition both for dirt and chemical contamination over an operational

period of 52,029 hours. This record is the equivalent of almost six years' continuous operation. Since this installation was made on a new engine, comparative operation with and without oil maintenance cannot be made. In the over nine years this engine has been operating the total replacement parts have been limited to the replacement of top rings on the pistons.

Normal continuous lubricating oil maintenance consists of adapting various filtering media to the machine's oil stream. The visible or physical contamination can be removed from the oil by a number of fibrous materials ranging from pulverized corn cobs to the finest grades of processed filter paper. The removal of this finely suspended matter from an oil stream is not done by straining through very fine orifices but rather by that physical filtering characteristic called "ABsorption". This phenomenon can best be illustrated by suspending a strip of blotter into an ink well. The blotter will become wet considerably further up the strip than the ink discoloration will rise. By "ABsorption" the blotter has stopped the pigment in the ink. Such filtering will remove from the oil stream dirt particles much smaller than the 10 micron size stipulated on the oil maintenance chart. However, this is a process that cannot be rushed. The flow rate of the liquid through the filtering media cannot exceed capillary flow rate:-roughly 31/2" per minute for liquids in the viscosity range of 140 to 160 S.U.S. This means that for each gallon per minute passing through the filter approximately 1/4 of a square foot of capillary orifices in the filtering surface must be provided. This usually means 11/2 to 2 square feet of bed area. The problem of filter bed depth cannot be settled as arbitrarily as area. A dense bed will stop more dirt per inch of depth than will a coarser one. It also requires either hotter oil or greater pressure to pass the



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Made in 3 sizes up to 124 lbs., this vise is precision built to give accurate positioning of work on drill press, shaper, planer, radial, miller, grinder. Various special jaws, stops, guides, bushings, etc., convert it to innumerable jig and fixture purposes for repeat-operation work, saving special toolmaking jobs.

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## GRAHAM MFG. CO.

54 Bridge St., East Greenwich, R. I.

liquid through it. The question as to the quantity and the quality of dirt that will be retained or absorbed by a cubic inch of a dense or open filter bed, or by this or that fibrous material is a moot question.

It has been stated that the flow rate through a fibrous filter bed must be at, or slower than capillary flow rate if "ABsorption" retention of dirt is to be secured. If sufficient pressure is applied to force the liquid thru the bed in excess of that flow rate, or the flow rate is maintained with the viscosity of the oil too high, "back-wash" of the filter bed will occur.

The requirements for the successful application ABsorptive filtration can be summarized as follows:

- 1—Sufficient filtering area must be provided so that the flow rate thru the filtering medium is below the capillary flow rate of the liquid being filtered.
- 2—Sufficient depth must be had so that the necessary dirt absorption can be accomplished.
- 3—The filter must be large enough to have sufficient dirt capacity for all the dirt being generated in the oil over a reasonable period of time.
- 4—Provision must be made so that surges in oil pressure, oil volume, or increases in oil viscosity do not "backwash" the filter bed.

The chemical contamination of a lubricating oil (the invisible contamination) consists of the gums, the resins, the organic acids, and the asphaltines that are formed either by partial oxidation and/or partial "cracking" of the oil itself due to the conditions under which it must function. It was this type of chemical oil contamination that gave all the trouble with the Clark Natural Gas engines previously discussed. These contaminants are generally acidic in reaction and hence laboratory determination of the neutralization number is usually a good index of the quantity

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The Madison locating feature automatically centers the cutter in the bar, equalizing the load on cutting

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The cutter block is formed by the Madison cutting blades themselves. This exclusive Madison feature

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These exclusive Madison features of simplified design are the reasons why the new Madison Rough Boring Tool performs with amazing speed. On field tests, stock removal requiring three passes with a conventional single point tool was executed in one pass with this new Madison Rougher.

Besides combining accuracy with fast stock removal, note on the production sample below, the finish produced by the Madison Rough Boring Tool as compared to the rough finish produced by a single point tool.

Cast Steel.

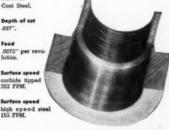
Depth of cut .697".

.0075" per revo

lution.

carbide tipped 352 FPM.

Surface speed high speed steel





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present. As a matter of fact the oil in the Clark engines never did get visibly dirty. There never were carbon particles, metal particles, or dust in any measurable quantity to remove from the oil. The contamination that did form was removed from the system by what is known as ADsorptive filtering. Certain clays-of which Fullers Earth is the best known-have the property of having a greater surface affinity for these contaminating unstable hydrocarbons than for those stable hydrocarbons which form the oil itself. Since this is a contact phenomenon, flow rate is not as important as contact surface and filter depth. ADsorption filtration is not as critical to filter design or to application as ABsorption filtration in the actual filtration problem. However, in the actual handling of the adsorptive filtering material, the reverse is true. Loose filtering clays are subject to migration, channeling, cleavage and difficulty in attaining beds of uniform porosity. When molded into a solid but porous block all of these handling difficulties become problems of manufacture and not of usage. With rigid process controls applied to the production line. Fullers Earth or other ADsorbent clay blocks can be produced having no material free to migrate and with very closely controlled porosity. With the use of such blocks, ADsorptive filtration can be easily and successfully applied to continuous lubrication maintenance.

With the proper proportioning of ABsorptive and ADsorptive filtration to the lubricating system the elimination of both the physical and chemical contamination to much closer limits than those given, can be made an accomplished fact. The elimination of water and fuel dilution then becomes an operating problem and not a maintenance problem. In internal combustion engines, since they are "heat engines", the hotter the operating temperatures (within practical limits) the

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more efficient becomes the engine. With the problem of stuck rings, lacquered pistons, corroded bearings, etc., removed by ADsorptive filtering oil maintenance, operating temperatures can be raised until the danger of blow-by water condensation in the crankcase is entirely removed. This same statement applies to fuel dilution except in the case of viscosity index, flash, fire, pour point, Conradson Carbon, and oxidation stability"—were the original specifications for the oil to be used. "Precipitation number below .05 neutralization number below .3" were the limits for contamination in the continuous maintenance of the oil.

The limit of .05 in precipitation num-

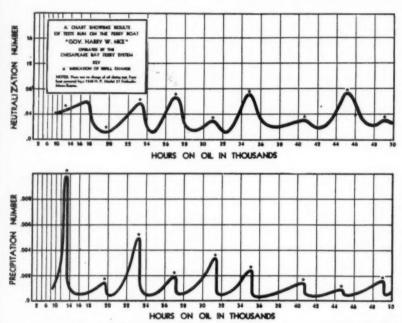


Fig. 5. Oil condition both for dirt and chemical contamination over an operational period of 52,029 hours.

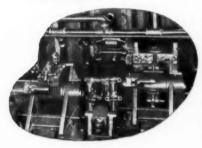
that fuel dilution which occurs during cold starts. Even under these circumstances the hotter operating engine readily evaporates this dilution from the oil when stabilized temperatures are attained, and fuel dilution never reaches the maximum allowed.

"Limiting specifications of viscosity,

ber does not materially affect any of the given specs except the limit for Conradson Carbon. To make an oil of low Conradson Carbon content usually requires careful and complete refining. This spec is written into new oil specifications to insure this complete refining. The changes that occur in this spec

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during machine operation have been proven to have little or no effect on lubrication efficiency.

The dirt limit of .05 precipitation number was set as protection for the machine itself. It is the limit to which most oils will carry dirt in suspension without depositing it in the oil passages on the interior of the engine itself.

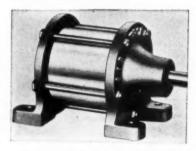
"Neutralization number below 3"—
this limit was set up several years ago
and the accumulated data still confirms
it as the safe limit particularly for the
lighter oils. The viscosity will not increase more than a few points, the viscosity index usually improves, flash fire
and pour points are unaffected, and
oxidation stability is usually improved,
when the oil is maintained below the
stated acid limit. In heavier oils, particularly those now being made by the
newer refining processes there apparently develops a high asphaltine

contamination with comparatively low neutralization numbers.

This asphaltine built up does adversely affect to a considerable degree those oil characteristics that are desirable to maintain. The top limit of neut, number may have to be lowered-or an asphaltine limit added. The overall picture. that continuous oil maintenance most nearly secures ideal lubrication for any machine is not affected by the necessity for modifying a specification limit for a particular application. Continuous oil maintenance equipment, given the proper thought on design, on application, and on desired qualifications can reflect almost unbelievable results in maintaining machine efficiency, increasing machine life, and reducing machine maintenance.

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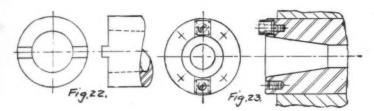
By H. F. Williams

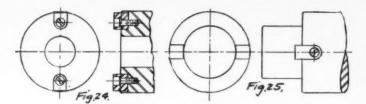
Part 2

THIS IS the second and final part on the design and discussion of various types of keys. While we usually think of the use of a key to guide a slidable shaft or to drive rotatively an object mounted on a shaft, keys engaging endwise play an important part in mechanics. Flanges, cutters, couplings and the like may have kevs milled integrally or keyways for the same in some instances. In Fig. 22, the end of the tapered bore spindle has cross keys milled at the spindle end. This is probably the simplest form of end key unless we wish to consider a pin-key, where the pin or pins are driven into the end of the rotating member, where in this example the keys are shown. The shortcomings of pin keys were explained in the previous article in that usually the contact surface was merely line contact either side of the pin. The theory has been ad-

vanced that pin keys, properly hardened and driven in tightly can be ground relative to the driving flats, after being assembled. This is to be contrasted to the desirability of milling the keys so they are an integral part of the spindle. However, a number of design questions must be given careful consideration: construction, strength, heat treatment, material, etc.

Probably the best known design of insert block keys is that portrayed in Fig. 23. It is the American standard for milling machine arbors and spindle noses and was sponsored by the American Society of Mechanical Engineers, the Society of Automotive Engineers and the National Machine Tool Builders Association. These block keys or tongues are fastened into slots machined into the end of a spindle having a self-releasing taper, the hole having a taper of 3.500 inches per foot. While the keys





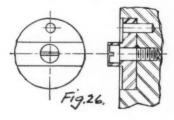
do the driving four additional holes are tapped for attaching the tools. There are four American standard tapered hole sizes, the large diameters of which are 1.250, 1.750, 2.750 and 4.250 inches designated as No. 30, 40, 50 and 60 respectively. The key heights and widths for the first two are  $\frac{1}{2} \times 1$  inches. The keys may be hardened and ground to assure permanency and accuracy. They are held in place with fillister head screws sunk below the top surfaces. The lengths are made to suit the spindle diameter.

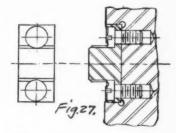
While in the foregoing example the slots for the keys are milled through from the hole to the periphery, another method as shown in Fig. 24 is available. Here an end mill is used, the end of the slot being blind. The half round ends of the keys abut the walls of the slots. They are also held in place by fillister head screws. They should be long enough to obtain a proper length of flat.

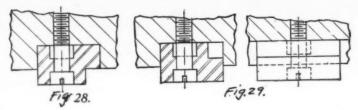
Sometimes the end of the spindle or shaft must be made with a pilot. In that case, the design in Fig. 25 can be used. The keys are the same general shape and fastened in the same manner, but are mounted into the periphery of the diameter beyond the piloted nose. The length of protrusion for engagement with the mating piece is usually half the width. The longer this key is, the more substantial the alignment.

Where it is undesirable to mill a keyway or when such facilities are not available, several keys as illustrated in Fig. 26 can be used. A short round slug is milled for the key portion and set in and fastened in a short bored hole. After the two keys are aligned a single dowel pin is driven in as shown. Only one is necessary in each slug if the fit between it and the hole is accurate, otherwise two pins in each key will be required.

In Fig. 27 is an optional design of driving tongue, used in an American standard spindle nose. Two fillister head screws hold it in place, these screws not penetrating the key proper except at the chamfered edges. The overall width







is made to have a good fit in the relieved and ground slots receiving the key. These also may be hardened and the contacting surfaces of the key proper ground.

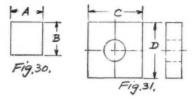
There are times when two widths of key are necessary, these widths being made to suit different fixtures. Or it might be required to have several pairs of different widths on hand if the fixtures are moved to other machines. Such a design is illustrated in Figs. 28 and 29. In Fig. 28, the key block is machined to fit the fixture and assembled thereto. The fillister head cap screw is placed off center or in the center of the narrow or protruding part. This part is of a required height while the slot in the fixture is somewhat deeper. Both ends of the hole for the screws are counterbored.

Fig. 29 shows the effect of the key when the wide part is required to engage the table slot. It is obvious why the milled out corner is shallower than that of the slot in the fixture. The centralizing shoulder should be greater than 1/16" in engaging height, ½" to 3/16" being satisfactory. The side view in Fig. 28 is similar to that of Fig. 29 except that the key would be reversed.

Square keys or those keys whose dimensions are nearly square are at times a nuisance to the assembly man in the shop and should be avoided where such a question arises. Cold rolled or drawn steel stock of the square variety is used, where accuracy is not necessary. This stock comes from the mill with a maximum and minimum width and

height varying as much as .005" for the larger sizes. This is, of course, the tolerance to which such rods or bars are drawn. Often a detail drawing of a key is made where dimension A in Fig. 30 is .500" with a minus tolerance of .001". Dimension B calls for 1/2". If this is at all possible, it means that the stock must be selected. In such an instance the contacting sides should be ground and a tolerance of .0001" held. The other dimension can go at 1/2". If the assembler is alert, he will insert the key properly with the ground sides where they should be and not contacting the bottom of the keyway of the fixture. Such dimensions requiring grinding necessitate a stock size of 1/2" by 5/8" with the %" width ground down to .500"-.001". The easier way for the assembler, especially where production warrants, is to surface grind all four sides. It would then make no difference how the key is assembled. If retaining screw holes are required in the key, the drill press operator will experience the same trouble if the former is used.

A clutch yoke or shifting shoe is nothing but a rotatively adjustable key. It is common to see a drawing calling for such a shoe 1.249"-.0005" for dimen-





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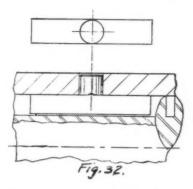
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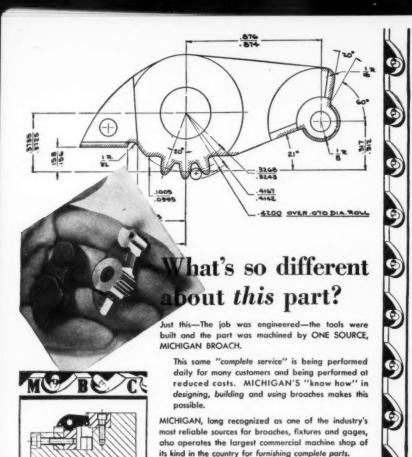
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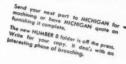
sion C as in Fig. 31 by 11/4" for dimension D. The hole is located .6245"-.0005" from one side. The same difficulty arises as explained in the previous example of Fig. 30. If it is necessary to hold to such fine tolerances the sides must be ground, and if grinding is necessary then larger stock is necessary than 11/4". Therefore, it should be agreeable to make the slot which engages the shoe, say 1.240" x .001" and using 11/4" square stock, grinding the shoe down to 1.239-.001" for a maximum freedom of .003" and a minimum of .001" or a finer tolerance if necessary. If the other rough dimension of 1¼" is really 1.244" or 1.245" then the assembler cannot fit the shoe in any way but the right way. If only tools are available for 1.250" width of slot then 1%" or 11/2" square stock can be ground to the proper size on two opposite sides. Assembly is made easier therefore if dimension is 11/4 decimal by 13/8" or 11/2" the other

An interesting type of key is shown in Figs. 32 and 33. It sometimes happens that it is not desirable to broach a keyway in the member surrounding a keyed shaft. In such a situation the key in Fig. 32 is the answer. The key position is made to the height desired but there is enough stock from which is





Four milling operations were required to machine this contour. It was broached in one operation. Broaching is faster, reduces scrap, requires less skilled labor.





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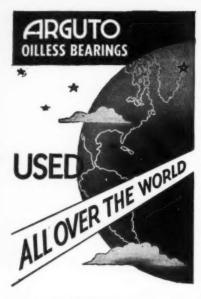
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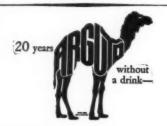
MACHINE TOOL BLUE BOOK

251



APPLICATIONS

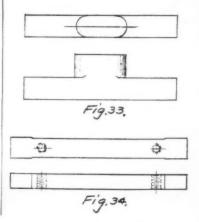
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hollow-milled a retaining pin the same or slightly smaller in diameter than the width of the key. The pin is inserted from within the bore into the drilled hole and the shaft slid into place. Selfalignment is of course another feature of this design. If such elaborate machining operations are objectionable, the same arrangement may be utilized by driving a pin of smaller dimensions through the key. If there is some length to the key two pins may be used, providing of course, that the strength of the key warrants it and that the size of the pin or pins does not become too small.

When the first type discussed above is desirable, but the width of the key is small, the design in Fig. 33 can be used. In this key the retaining portion is elongated and therefore will be considerably stronger. Machining is a little more difficult for both the pretruding part on the key and the slot into which it fits. However the hole for this "pin" may be made round, as large in diameter as the length along the length of the key. In this case if the key is '4" wide and the length of the protruding part '4", then a '4" hole could be



drilled for the same, the "pin" fitting endwise only.

When a long key is required for aligning purposes as attached to the bottom of a plate, a key such as shown in Fig. 34 can be used. This is sometimes preferable to two block keys placed at opposite ends of the plate. The sides of the key in this instance are relieved about 1/64" per side except at the extreme ends where it contacts both slots in the mating pieces. Tapped holes are for attaching from above but counterbored holes may replace these tapped holes for attaching from below the plate.

When a shaft or spindle has a Wood-ruff key milled on its periphery and must be further machined, especially when a driving dog cannot be attached, a key as illustrated in Fig. 35 can be utilized. The rounded portion fits the Woodruff key cavity. The long rectangular part is fitted into the slot of

the driving member and fastened with a screw. Additional operations such as threading, milling, grinding and indexing can be performed without the customary driving dog.

Another interesting example of a key with beveled ends was recently illustrated in an article appearing in the BLUE BOOK showing how a gear rack was fastened to a sleeve. The rack surface opposite the teeth was dovetailed and fitted into a similarly milled slot. A cross slot milled in both the sleeve and thru the dovetail on the rack to the depth of the dovetail accommodated a thin key. In this manner the key retained the rack endwise and the dovetail held the rack crosswise. The beveled ends of the key conformed with slight clearance to the curvature of the cylindrical sleeve.

A hardened steel ball can be used as a retainer key in some cases to keep a tool in a spindle from falling out. In



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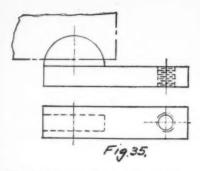
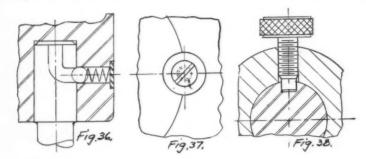
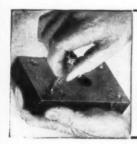


Fig. 36, the ball, which is backed by a compression spring, is used to hold a punch in the punch-press ram by means of a bayonet joint. A rounded groove with a depth of ¼" of the diameter of the ball is machined in the periphery of the shank of the punch making a right angle turn 90° around

the shank. The punch is inserted and given a quarter turn to lock. The end of the shank abuts the bottom of the hole in the ram, the hole being square at the bottom to properly absorb the thrust of the punch in action. The spring is retained by a thick, washer-like plug pressed into the counterbored hole.

A thin disk as in Fig. 37 can be used as a key when other forms of keys are impossible to be fitted. The center of the disk falls on the bore circle so that half of the disk contacts evenly in both members. The disk is countersunk for a machine screw, the tapped hole for which must be machined after both pieces are assembled. A conical lock washer can be used if necessary. If the disk can be of sufficient thickness, a counterbored hole may accommodate a fillister head screw. Here also a lock washer can be inserted into the counterbored hole before the screw is





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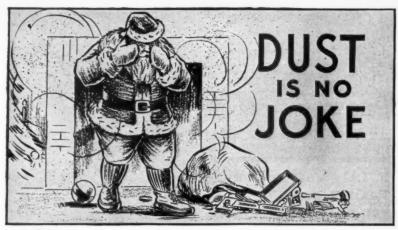


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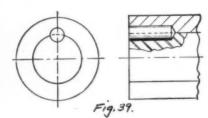
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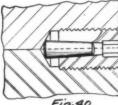
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A knurled thumb screw as illustrated in Fig. 38 can be used for light work, where the end of the threaded part is machined as a dog-pointed screw. As mentioned previously such a key has only line contact diametrically opposite as the screw contacts the keyway. However in this design the important feature, next to that of acting as a key, is that a partial turn of the knob locks the screw against the bottom of the keyway when a predetermined position of the shaft is reached. In similar designs it has been found necessary to use a lock nut under the head of the screw. In this case the nut is round and knurled as the head of the screw.

A so-called "dutchman" is nothing more than a cylindrical key in the form of a plain straight pin as shown in Fig. 39. It is usually inserted in a drilled or reamed hole, half of which is in the internal piece and half in the external member. Sometimes two dutchmen can be seen holding a cylindrical piece in a hole, the thought being that when a dowel pin is used, dowels must be used in pairs. If it is erroneously classed as a "dowel" pin instead of a round or cylindrical key, the hub being retained in the round bore really acts as one dowel. If, however, it is felt that such a cylindrical key is too short, then it is justifiable to use two or even three, if the torque load is severe. In fact such a case has been observed where a phos-



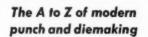


phor bronze worm gear of ample size was pressed on a cast iron center and held with four dutchmen on either side of the gear, both sets of four pins staggered so they were 45° apart, although 90° apart per side. Obviously the case of a large worm gear made of bronze was one of the considerations, but because a large feather key was used, it was considered better that the key should contact cast iron instead of bronze. The dutchmen were used as a safety factor even though the bronze toothed rim was shrunk on.

The thought is often expressed that because the external surface of a dutchman is rounded upwards and downwards from the joint, namely at the centerline of the pin, that the driving characteristics do not compare to those of a key having squared sides. In this regard, consideration should be given to the projected area of the contacting surfaces of the pin so that size for size, the driving surfaces of such

keys would be the same.

Usually when a dutchman is inserted it is with the understanding that it is "for keeps". This sometimes cannot be the case and the only way to get it out is to drill it out. However, there is a way by using a screw as a dutchman which is half and half in two members. But a screw used as such is usually too loosely fitted to be a positive driving member. In Fig. 40 is shown a method of using a heat treated hollow head screw having a tapered pin hole at one end running into the hexagonal socket for the wrench. The screw is slotted with 3 or 4 cuts long enough to reach to the end of the tapered pin. The pin centers at the bottom of the conically ended drilled hole so that the further the screw is turned in the more the tapered pin expands it into a snug fit in the threaded hole. Four of these combination screws and pins have been observed holding two heavy cylindrical castings together.





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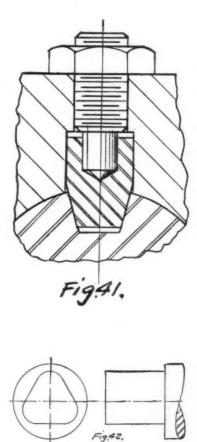
The Macmillan Co., 60 5th Ave., New York 11



Another form of taper sided key is illustrated in Fig. 41. Shims for adjustment are not necessary to keep this type of key snugly fitted in the slot. The key has some length and is adjusted from without by a hollow head conically ended dog point set screw. It fits into the drilled hole in the key and is locked, after properly adjusted, with a hex nut. When the key is of sufficient width at the tapered sides, the upper end accommodated the end of the screw need not be so long, the drilled hole can penetrate the key closer to the tapered sides.

Altho multiple splines have not been discussed in this article it will be of interest to the reader to see how a rounded triangular shaper was used to replace the use of splined shafts as we know them. This form of profile, shown in Fig. 42 known as the K-profile, was developed by Ernest Krause & Co., A.G. of Vienna about 8 years ago. Altho a specially designed grinding machine is required to machine the profile with the required accuracy, it was pointed out that more special machinery was necessary to finish satisfactorily a heat treated spline shaft. The K-profile was also said to replace successfully the use of single keys, as witness the list of machine details the bores and mating pieces of which were finished with the tri-angular hole. Such pieces as gears, cams, pulleys, drills and sockets, arbors and cutters and others, are finished thus. In fact, on the grinding machine for producing the profile, nearly 50 places were observed where the shape was used. In some instances the profile for both the external and internal pieces were ground on the same machine. If in other cases the hole or bore was originally broached, then the broach itself could be sharpened on the machine. It was also evident that plunge grinding could be used instead of overtraveling with cutter or grinding wheel

as necessitated in the finishing of spline shafts. On drills in particular no driving tang was necessary. The machine was arranged to impart a predetermined movement to the wheel carrying head and spindle, in exact relationship with the rotation of the work.



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# THE FOREMANSHIP FORUM By Edmund Mottershead

### The Modern Techniques of Conference Discussion

HE CHANCES are small that you will emulate the professional lecturer, the soap-box orator, or the political speech maker. As a modern speaker, you will address yourself primarily to groups, committees, conferences, forums, business meetings, etc. And you will speak from the floor; take part in discussions. Your purpose will be to cooperate with your companions to obtain a group decision or group action. You may be asking for group action in the form of a vote on a proposal. But you will be speaking in a situation where your listeners can, and will challenge your views, ask questions and speak in their turn against your stand. How can you be most effective in this situation? There are five things you must be for maximum effectiveness:

- 1. BE PURPOSEFUL
- 2. BE PREPARED
- 3. BE RELEVANT
- 4. BE BRIEF
- 5. BE ORDERLY

lodges, or associations more because of some indefinite notion that through the club you can make "contacts" and further yourself than because of any real desire to give life to that organization. Thus, you attend meetings and say little or nothing; often, when you do speak, your words seem to have little or nothing to do with the eventual decisions of the group.

To change all this, consider for a moment the basic purpose of the club or group to which you belong. Think over the problem confronting that group., Make a decision on that problem. The next time you attend a meeting, speak to the group about your decision; don't hope for decisions, make them yourself and tell the group about them.

When you take your stand on the problem, don't let someone else suggest action. Your decision has probably determined a course of action in your own mind. So, ask for action! And when you are asking for action, don't be vague and indefinite about what you want. Ask for a vote.

Principle One: BE PURPOSEFUL!

- 1. Make a decision.
- 2. Ask for action.
- 3. Ask for a vote.

1. BE PURPOSEFUL! "What do we mean by that?", you say to yourself. "If I hadn't some reason for attending one of those meetings, I wouldn't be there." Maybe. But if you are like thousands of other people, you belong to clubs,

2. BE PREPARED. Again you say to yourself, "What do you mean, be prepared? I can't take the time to prepare what I'm going to say and think before I go to each meeting. And anyway, many subjects arise for which I couldn't possibly prepare." Right. What we mean by asking you to be prepared is this do not talk in a meeting unless you know what you are talking about. Otherwise you waste a certain number of minutes multiplied by the number of people in the group. If you say nothing of importance for ten minutes to thirty men, you have wasted five hours' time!

What we are asking you to do is to be sensible in your thinking . . . not to draw impossible inferences from the facts at hand. For instance, don't inferfrom the fact that there are 650,000 homes in your city that you can sell a vacuum cleaner or even a newspaper in

every one of them.

Tact and understanding are essential to a successful conference speaker. When rising to disagree with the man who has just spoken, first restate his argument in your own words as fairly as you can. Take issue with him on an impersonal basis . . . you are not debating him, you are simply presenting facts and arguments in opposition to other facts and arguments. Take issue with your opponent conservatively . . . he has some sense . . . he is not a complete idiot. There may be a large amount of truth in what he says . . . recognize that he is also trying to arrive at a fair decision for the group. And at all times, be friendly.

Last of all, sincerity is important. When you are physically animated, you express sincerity and conviction. When you are conversational in tone and language, you express honesty. Be your-

self, be sincere.

Principle Two: BE PREPARED:

- 1. Know what you are talking about.
- 2. Be reasonable in your thinking.
- 3. Be tactful in your manner.
- 4. Be sincere.

3. BE RELEVANT! "Well," you say, "that's a little easier to understand. You mean I should keep to the point?" Exactly. But what point? When you feel the urge to speak in a group discussion, ask yourself a couple of questions: "Do I understand the precise proposal being considered? Does what I have to say have a direct bearing upon it?"

Almost any proposal for action in a group, debatable proposition, or request for a change reduces itself to these five

basic issues:

Is there a NEED for a change?
 What is the CAUSE of the present

3. What PLAN is proposed as a solu-

tion?

4. Is this proposed plan WORKABLE?
5. What will be the RESULTS . . . good or more evils?

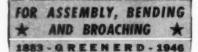
Anyone making a proposal for group a ction, requesting, for example, a change in policy in a department or plant as a whole, must show that a NEED exists for a change.

In treating a rash, it is a waste of time to supply ointment for the skin when the cause lies deeper. Something is needed to get at the root of the trouble. In asking for group action, ask for action which is directed at the cause

of the problem.

Talking about troubles doesn't get them fixed. You need a plan. For every problem there is a solution, that solution must be presented together with the problem before anything can be done. Present a definite workable plan for action. Show how it is workable and practical. Pipe dreams are no good. Plans that will not work are useless and a waste of time. A broken-down furnace is no answer to a cold house.

Finally, having found a need for a change, having discovered the cause and developed a definite plan which is apparently practical and workable, what will be the probable results? Many fine and workable plans cannot be put into





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GREENERD ARBOR PRESSES NASHUA, NEW HAMPSHIRE, U.S.A. EST. 1883 action because, while they will eradicate the cause of the present evil and perhaps remove the evil itself, they will at the same time create new and worse headaches . . . out of the frying pan into the fire. Will the ultimate results be beneficial?

In many actual discussions these five basic issues are not supported by the advocates of change, and they get their change anyway. Often a stirring emotional appeal pointing out the need for change, together with a hazy plan will force an adoption without considering its workability or possible bad results.

Principle Three: BE RELEVANT.

- 1. What is being considered?
- 2. What are the issues?
- 3. Where is the burden of proof?
- 4. Does what I have to say bear upon an issue?

4. BE BRIEF! "Sure," you say, "that's easy. I can understand that all right but how am I going to cover all the basic issues in a problem without talking at length?" That's a fair question. Let's see what your problem really is.

If there is no business under discussion and you are introducing a new problem, you have an opportunity to make a substantial talk, present a complete and clear-cut case, and end up by asking for the votes of the members present. You can take five minutes or an hour to do a good job. But that is about the only such opportunity you have. After the problem has been thrown open for discussion, everybody takes a crack at it. Then your problem becomes acute.

One speaker will get up and disagree with you on one point. Another will get up and defend you on a different point. A third will disagree on still a different issue. You have a melee. Your strategy in coping with it is known as the "speech sprint".

Make a series of short talks instead of one long one. The poet Southey said,

262

"If you would be pungent, be brief, for it is with words as it is with sunbeams; the more they are concentrated, the deeper they burn." If you would be effective in conference discussion, make a series of talks, pack a single idea into each; express each idea as concisely as possible. In making these short speech sprints, you do three things in each talk:

- 1. State the issue you are discussing.
- Present the arguments supporting your stand.
- Ask for group action on the big problem because of your stand on this individual issue.

What is the result of this strategy? A direct clash of argument, a meeting of minds. The basic issues are taken care of one at a time, and when one is settled it is unlikely to appear in the discussion again. Instead of making a big speech when presenting the original idea, it is best simply to state the need and present your plan. Then handle the basic issues as they arise. Good generalship in putting through a proposal will sometimes mean that you organize half a dozen supporters before attending the meeting, each one being prepared to take one of the basic issues and handle it as it appears. Team work and cooperation with the speech sprint technique are essential in getting speedy and sound group decisions.

Principle Four: BE BRIEF!
Use the speech sprint technique.

5. BE ORDERLY! "What do you mean, orderly?" you may ask, "if to be polite and quiet and act like a civilized human being means to be orderly, I understand you." When we ask you to be orderly, we have something more in mind. You have time and again participated in meetings and discussions which went on and on and arrived nowhere. Confusion and misunderstanding conspired with disorderliness to bog down the entire meeting. Was it not

von Moltke who said, "Anything which can be misunderstood will be misunderstood."? If there is any chance of a discussion becoming disorderly, that will surely happen.

Parliamentary law was developed as a set of rules for the conduct of a meeting. The use of these rules, or at least a part of them, makes for efficient discussion and quick decisions. Use of these rules is necessary in any group which is not small and informal. As a modern speaker, talking from the floor or conducting a meeting, you need to know the principles of parliamentary law. You need to know how to get permission to speak from the floor, how to introduce a proposition, how to handle a discussion, how to end a discussion, how to act as chairman. And at all times you should be familiar with the formal processes of obtaining group action.

Principle Five: BE ORDERLY!

- 1. Have a set of rules for conducting your meetings.
- Use those rules to get group decisions.

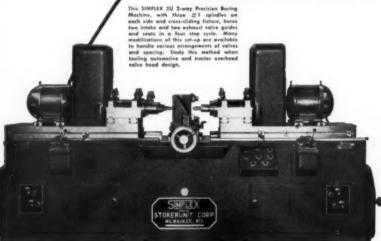
The modern speaker is the speaker of the conference room or committee. The foreman who will grow in leadership ability and rise to higher positions in the company is the foreman who can take part in meetings, express his ideas effectively, and make a sound contribution to the solution of the problems at hand.



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# Better Vision Reduces Accidents

By Ernest W. Fair

A UTHORITIES have discovered that 80 per cent of all human motions are controlled by the eyes. Yet, in most machine shops the average worker does not think of his eyes until he experiences blurred vision, headaches, or other discomforts. He may lose a finger or be relieved of his job because of mistakes caused by his bad vision.

A number of important surveys have shown that the employees with the greatest deviation from recognized visual standards have the largest accumulation of accidents. In one such test where these employees fell below all vision standards or passed only one test, a 61 percent of accumulation of accidents occurred in 18 days. Those employees who passed from two to five tests had a 29 per cent accumulation, while those who passed six to eight tests had only 11 percent accumulation of accidents over the same length of time.

Many studies of eyesight in factories and shops have revealed that persons with uncorrected visual inefficiency are more prone to accidents than workers with efficient visual performance. Eyestrain causes fatigue, nervousness and lowered alertness.

Today by means of psychologicallysound testing procedures and a factfinding system developed within the optical profession which is known to all top-ranking optometrists, it has been found possible to determine the relationships between visual performance and safety. All of this information should be applied not only to new employees before they are assigned to their jobs, but should be on the regular check-up schedule of the plant. Eyes are as important as maintenance in the shop and should receive the same attention.

It has also been found that it is a mistake to indiscriminately use safety eyewear without consideration of the basic seeing abilities of the employe. Such general procedure has in many cases produced almost no safety at all. It is possible to apply given safety standards to machine guards in a plant but it is not practical to apply a single standard to every workers eyes.

Tests should be made to determine to what extent the employe meets the standards of visual performance for his job and safety; those found below these standards should be referred to professional eye men for immediate attention.

It should also be determined to what extent the individual employe meets the visual standards for his job and for safety after correction. There should be no set standard for the whole shop or plant; rather it is necessary to set standards for each job and these should be rigidly applied. Such information is available from optical and safety eyewear companies at the managements request and is too voluminous to present

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HENRY A. EVERS CO. 21 Eddy St. Providence, Rhode Island herewith; in addition such data should be applied by a competent optometrist and interpreted by him for the individual job. This should apply to the specific individual conditions in each plant, and not applied on a general over-all basis.

Here's a point often overlooked: If safety eyewear is needed on the job and the employe meets the visual standards, he should take an ortho-rater or some such similar test while wearing the safety eyewear to determine what difference, if any, even plano lenses produce in his basic seeing performance.

Every shop can well initiate a program of industrial vision with the cooperation of its health center or firstaid department or with the ophthalmic professions.

A program should be introduced which will enable the shop management to acquire facts which will result in selling the safety program more completely by that shop; facts on visual functions should be constantly brought to the attention of employees by every means available.

Nor should the industrial visual program be an "amateur" effort; expert advice will reap handsome dividends. One should make certain that statistically determined standards are established by their own organization and their own investigation under competent guidance. After these standards are established their value should be checked by constantly making predictions of the employees most likely to have accidents and subsequent injuries.

Creating an eye consciousness among employees is of the utmost importance in such a visual safety program. Then the employe himself, if he is below the standards set, will do his best to maintain a constant guard against accident. That in itself will help to eliminate all of those types of accidents brought about by his carelessness or lack of



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thought as to the part his eyes play in his work and in the prevention of injury to himself.

Facts speak in such a promotion, and no opportunity to present them should ever be overlooked. While the accident itself is a powerful lesson for every other employe in the plant, it is the hard way to present facts. Using the volumes of available material which can be secured from many sources, such as all of us are acquainted with, will prove as practical as the accident itself.

Every machine shop executive constantly receives such programs for his consideration; each should be investigated completely and fully and no tiny detail of the program should be glossed over. A program of pretty charts may look good but it doesn't always get results; much more is needed in the average machine shop. Such a program, if it is to produce maximum results can well contain the following steps:

a—The inauguration of a determined program demanding the co-operation of every employe.

b—Individual tests and examinations of every employe given at least once a year.

c—The establishment of standards between each worker and his individual job, and not of a basic program for the whole shop.

d—The constant driving for attention to the program itself after these steps have been taken.

Better vision, and better control of vision as well, mean less and less accidents in even the smallest machine shop.

### AID IN TAPPING

"Production Tapping Guide" is a new informative booklet recently published by the Cleveland Tapping Machine Co., Dept. BB, Hartwell, Ohio.

This booklet contains figures, data, and other information designed to assist the estimator, set-up man and operator in employing production tapping to the best advantage.

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# WHAT'S NEW IN METALWORKING

### HYDRAULIC CUT-OFF MACHINE

Featuring safety, speed, and squareness of material cut, from the hardest of steel to the softest of non-ferrous metel, the Geo. H. Bullard Company, Inc. of Westboro, Mass., has developed, and placed on the market. a hydraulic cut-off machine.

The abrasive wheel is fully enclosed and is not exposed at any time to provide added safety. The spindle turns at 3500 rpm, giving the wheel a 13500 sfpm speed. The wheel is forced into the material to



be cut by a hydraulic cylinder, which allows the proper amount of pressure to be used without burning. When pressure is set, it remains constant, and rate of work travel is the variable.

The machine is designed to hold material on both sides with equal pressure, so that the stock is finished to within .003" of square, which is practical for most machining purposes. V-ways controlling motion of wheel through the work are within 2" of wheel center, thus eliminating motion causing wheel "walk".

A single starting button operates both motors (1/2 - horsepower and 5 - horsepower) The material is inserted on V-

work trough to desired length to be cut, then the foot control is pressed, forcing the hydraulic work clamp down. Pressure varies, with hand valve setting, from 50 to 90 on the gauge. Pressure is from 157 to 282 pounds. After the clamps are down, the wheel automatically starts upward. When the cut is completed, the foot control is released and the wheel drops down into the case before the clamps on the stock are loosened. The operator's hands are free at all times to guide the stock into position and to set the stop to desired length.

One of the most important units of the machine is the spindle. This was designed for long wear. The arbor runs on two double rows of felt sealed ball bearings. The estimated life is from two to three

vears

A complete stock of parts is available at the factory at all times. Size of wheel recommended is 14" x 3/32" x 1", resinoid bonded. Delivery can be made in eight weeks from receipt of order. Please send all inquiries to Dept. BB of the G. H. Bullard Co.

#### INSIDE AN ARC FURNACE

The vivid changes occurring within the walls of an electric arc furnace during a heating process may now be seen in actual color thru the eyes of the motion picture camera.

A dramatic, 15-minute picture story entitled "Melting of Huron Die Steel," produced for the Allegheny Ludlum Steel Corp., at its Dunkirk, N. Y., plant, graphically reveals what the human eye never has been able to observe—the true color

of the molten steel and slag.

Slag covering the molten steel is first shown, followed by shots of the true color of the steel itself as the slag is broken apart. Animated diagrams describe the melting process from the moment the scrap is placed in the furnace until the pure stainless steel is poured into the ladle.

### announcements in



# The New TRB-S56

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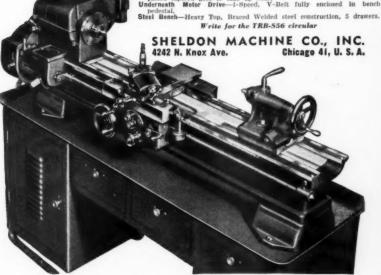
New . . . the well known "S56" now combining 111/4" swing, 1" collet capacity and zero precision tapered roller bearings.

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Headstock Bearings—Tapered Roller Bearings—Zero Precision Collet Capacity—I Inch (round) Hole Through Spindle—1% inch Swing—II% inches Bed Length—56 inches Distance Between Centers—35 inches Spindle Drive—Double V-Belt precision of the College of

per inch Full Double Walled Apron-Worm driven longitudinal and cross feeds. Dovetail Taper Gibs—Compound Rest and Cross Slide have screw adjusted tapered gibs to take up wear. Underneath Motor Drive—i-Speed, V-Belt fully enclosed in bench

Write for the TRB-S56 circular SHELDON MACHINE CO., INC.



This is the latest Allegheny Ludlum film to be made available free of charge for technical and lay audiences. It also is the first of a series that will tell the story of tool steel from its beginning thru to the finished product.

Another new Allegheny Ludlum film, also available for free showings, is entitled "Corrosion," and contains an explanation of the mechanism of corrosive attack and the development of stainless

Write to Dept. BB of the company if interested in these films or their many products.

#### CIRCULAR DIVIDING TABLE

The Cosa Corp., who are the United Genevoise D'Instruments de Physique, sometimes referred to as SIP, of Geneva, Switzerland, announce the new Rotoptic High Speed Precision Circular Dividing



Head Table with a working surface diameter of 311/2".

This has been designed for use with the Hydroptic B Jig Boring and Milling Machine and has been built to withstand the transversal stresses caused by milling. The worm is used only for rotating the platen, while angular measurements are made optically. This is said to eliminate any inaccuracy which might later be

caused by wear.

The outer edge of the platen is graduated in 1/6ths of a degree. Measurements are made on a built-in graduated circle by means of a microscope. A vernier reading of 1 second of the arc can be made. The platen may be rotated at 4 rpm by means of a motor, operated by push buttons.

All parts are said to be protected from dust, chips and coolant. The company reports that the accuracy of the Rotoptic is comparable to that of the Hydroptic B Jig Boring and Milling Machine.

For more information on this and other products write to the Cosa Corp., Dept. BB, Chrysler Building, New York 17, N. Y.

### TOOL STEEL

Ground flat stock for dies, jigs, gauges, fixtures, models and many other uses is now available from Tech Tools located at Lisle, Illinois. This electric furnace-produced tool steel is available in long lengths as well as the standard 18" pieces, and in a greater variety of sizes. The longer lengths, however, permit the cutting of specialized sizes with a minimum of waste.

mum of waste.

TECH STEEL is said to have a uniformly good finish with all scale and decarbonization removed. This is due to the careful grinding performed with precision surface grinders. For easy machining, TECH STEEL is thoroly annealed. Dimensional accuracy of plus or minus 001 in thickness is claimed. Large stocks are maintained for prompt shipment.

An informative data sheet on ground flat stock is available on request. This contains a price chart for the full range of steel sizes. Suggestions are also included for the hardening and quenching for various thicknesses of steel. Copies may be obtained from Dept. BB of Tech Tools. Lisle. III.

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### LITERATURE ON CINCINNATI 2M1 MILLING MACHINE

During the past months there has been considerable publicity given to the new Cincinnati No. 2M1 Milling Machine. The Cincinnati Milling Machine Company, manufacturers of this machine report the publication of an attractive 36-page, three color catalog which tells the complete story concerning it. Many large-size illustrations show the details of the machine. Charts and drawings are included to give specifications.

The 2M1 has a spindle speed ratio of 60 to 1. This is designed to give top efficiency during milling operations on parts made of various grades of steel, cast iron, aluminum, bronze, etc. A single crank type control selects the complete range of spindle speeds. The feed ratio of 120 to 1 is also selected by a single crank type control.

The principle lubrication is automatic. Oil levels are visible. The coolant pump, cross screw and spline shafts, electrical controls. vibration damper, motor and other items are built into the machine.

The many features of this machine can be seen only by reading this bulletin, No. M-1506. Write Dept. BB, Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

#### MIDGET WORK HOLDING SPINNER

Great speed and uniform results in polishing and buffing small round, cylindrical and flat circular parts is claimed possible by the Midget Work Holding Spinner No. 221M, announced by The



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4	1/2	1-11/4	8.36
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5	5/8	1-11/4 1-11/4	12.34
5	3/4 7/8	1-11/4	13.46
5	7/8	11/4	15.75
5	1	11/4	15.75
6	1/4	1	14.56
6	16	1	14.56
6	3/8	1	14.56
6	1/4 3/8 1/2 5/8	1	14.56
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They have just completed the Cincinnati Hypro Automatic Boring and Turning Mill for machining rolled steel car wheels. This machine is completely new in design and production methods. The finished wheel from this machine is claimed to be more accurate and better balanced.

The company reports that production time has been reduced considerably, as approximately six wheels per hour can be obtained.

A new chucking method is used for holding the wheels which allows the hole to be free so boring of the center hole may be done simultaneously with the rim, flange and tread. The jaws on the chuck are operated from one central lever.

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ing in idle periods on the "helpers" machine and risk of strain and injury to all involved. • Solve this problem with PORTELVATOR, the Hamilton Portable Elevating Tablel Raises and lowers, transports and height adjusts. Heavy tools and materials are ROLLED from place to place, raised or lowered to desired position and SLID from Portelvator to work surface. Saves time, strain and effort. Enhances profits. • Made in three standard models to lift and carry 1,000 to 5,000 pounds. Special models designed for "outsize" requirements. Write for literature and prices . . . Address Department A-P.





Hamilton TOOL

SUPER SENSITIVE DRILLING MACHINES TAPPING MACHINES - PORTELVATORS

TOOL COMPANY

NINTH STREET AT HANOVER . HAMILTON . OHIO . U . S . A

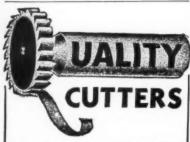
equipped with thymatrol motors electronically controlled and screw operated.

The machine is driven by a 100 hp main drive motor and table speed of 5 to 25 rpm are provided. The complete machine is electronically controlled to provide less maintenance and better operation. All gears and shafts are preloaded.

The machine is arranged to take wheel sizes from 33" to  $40\frac{1}{2}$ " inclusively. A machine for other wheel diameters can be

furnished.

The following advantages are reported by the manufacturers:



### The Standard of QUALITY.

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

THREE-FOURTHS OFFSET.

Write today for prices.

Few Territories Open.

QUALITY TOOL WORKS Market St.,

Waukegan, Illinois

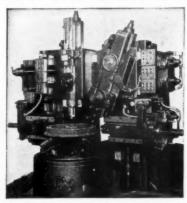
1-Fully balanced rim thickness at no extra cost.

2-Longer wheel life.

3-Reduced wheel maintenance.

4—Greater production.

Other machines and developments. made for railroad work include the de-



velopment of a new Cincinnati Hypro Tire Mill for the machining of locomotive tires and a great number of im-provements on their present Heavy Duty Hypro Frog and Switch Planers for machining rails.

Write to Dept. BB of the company for more information on this and other products.

USE OF STEEL ALLOY

"M-11", a chrome-cobalt high speed

steel specially developed for taps and threading tools is now being used ex-clusively by Detroit Tap and Tool Co., 8432 Butler St., Detroit 11, Michigan, for

CLOSED CLOSED MARK TRADE < Plain Type NTINUO HIN All hinges shown can be SPECIFICATIONS: Open Width %\* to 6\*
Gage Material .040 to .125
Pin Diameter .101 to %
Lengths to 120\* AUTO MOULDING furnished with special holes, cutouts and bends to blue-print in metals to & MFG. CO. suit the job.

> CHICAGO 19. ILL. MACHINE TOOL BLUE BOOK

1110 E. 87TH ST.

SEMI-OFFSET

#### NEW DEARBORN MODEL 11 11 CHUCKING THE

#### INDEXING FIXTURES AND



Dearborn fixtures meet every demand for automatic chucking and indexing, permitting several operations on the same piece

with only one setting.

Model E is both a degree and a ratchet indexing fixture. It may be changed from one to the other in less than a minute. It will index any number of degrees or any fraction of a degree. Two adjustable stops

are provided so that two

necessary.

Work is held by collets which take up to and includ-ing 1" round, 3" hexagon and 34" square. Other shapes can be held with special collets.

Let us send bulletin giving full information.

### J. W. DEARBORN

ANSONIA, CONN., U.S.A.

### A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.

MACHINE TOOL BLUE BOOK

BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907 SO. BARCLAY ST. MILWAUKEE 4, WIS.



PROMPT SHIPMENT

Standard Trans. Equipt. Co.

3407 Verdugo Rd., Los Angeles 41

its complete line of standard and special taps carried in stock and other special taps designed and produced to special order.

According to Detroit Tap officials, its "M-11" steel has a number of outstanding advantages making it highly desirable for use in taps.

They report that some hundreds of thousands of M-11 taps were produced and proven in service prior to the announcement.

#### TRANSVERSE TESTING MACHINE

A hydraulically operated transverse testing machine with a capacity up to 10,000 pounds—identified as Model TR-1—has been announced by Steel City Testing Laboratories, Dept. BB, 8843 Livernois, Detroit 4, Mich. The machine is supplied with electric motor drive at voltages to suit current requirements.



The load is applied automatically, at desired speed. The specimen is loaded on the supports and raised by the load lever.

A specially constructed gauge with maximum indicating hand is supplied which remains stationary when the specimen breaks, permitting the operator to get accurate readings even tho he is not looking at the dial when the ultimate breaking point is reached. Gauges may be calibrated in kilogram loads if desired. It has 24" maximum span, 4" opening, and floor space of 26" x 20".

### "MIRACLE" COLLET CHUCK

The New Miracle Collet Chuck, adaptable to any standard bench lathe, is now in large scale production by Micro Parts Company.

Many outstanding features are claimed



for this device, for example it can be used with stock up to one inch, permitting the full capacity of the lathe; it can be installed in a few minutcs—no holes to drill and no tapping or grinding necessary. The entire unit revolves on the spindle which eliminates heat and friction and no bearings or retainers are employed, which does away with the need for lubrication.

Additional collets are also available in rounds, squares and hexagons,

Further information may be obtained from Dept. MTBB, Micro Parts Co., 322½ E. Beach Ave., Inglewood, Cal,

#### PRESSURE GAUGES

The Dayton Rogers Manufacturing Co. announces the introduction of a complete new line of streamlined pressure gauges.

This new streamlined design has a nonbreakable crystal of convex layout, and the dial is so lettered in contrasting letters that the graduations are very easy to read, which also includes a newly designed red-enameled pointer.

The movement is so constructed to absorb all shocks from severe uses, assuring longer life under all conditions. This pressure gauge, of the Bourdon Approved Type, is suitable for any liquid or gas, and cannot corrode from steam, water, air, etc. Any movement or distortion of the pressed steel case will not affect the accuracy or reading of the graduated dial. The gauge carries a one-year unconditional guarantee.

For further information write Dept. BB, Dayton Rogers Mfg. Co., 2835 12th Ave. So., Minneapolis 7, Minn.



It's mew. It's marvellously improved. Actually 6 tools in 1, it does hundreds of jobs that an ordinary wrench can't do. That's because it fits as it grips ... and it holds ... with more than a ton-and-a-half pressure, even when the hand is taken away. Releases with the flick of a finger.

#### JAWS ALWAYS PARALLEL

An exclusive patented device that moves the toggle for varying sizes of grip, keeps the jaws parallel when they close. Prevents rounding of nuts, slipping and accidents . . . assures even pressure and a firm grip to very tip of jaws.

7—Max. Jaw opening 34" \$2.45 9—Max. Jaw opening 1" \$2.95 11—Max. Jaw opening 1 1/2" \$4.60

For sale at leading hardware, auto equipment, mill supply, plumbing, electrical stores & departments.

BMC MANUFACTURING CORP.

# AMC Quick DEMAGNETIZER



A necessity where machine tools are used.

Standard units available and special sizes to order.

Write today for descriptive circular.

ALOFS MFG. CO.

1629 Madison

Grand Rapids, Mich.

### BOX-BODY POWER CHUCK

The Skinner Chuck Co., 341 Church St., New Britain, Conn., has resumed the manufacture of its series 1400 and 1400-A self-centering, power-operated, two-jaw, box-body chucks. These items were discontinued during late years to enable the company to meet its wartime commitments.



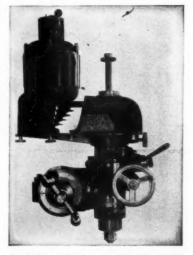
The primary use of these box-body chucks is for production work on objects of irregular shape, such as valve parts and pipe fittings.

Present production is in the 9" rated size only. The maximum capacity of the

chuck (inside the jaw-holding screws) is 4½ inches. It is available in 8¼" and 12" diameter sizes.

#### CHANGES IN DESIGN

The H. Leach Machinery Company, 387 Charles St., Providence, R. I., exclusive national distributors for the Fray Machine Tool Co., recently announced several important improvements in the Fray "All-Angle" Vertical Milling Attachments. These attachments are being manufactured in four types.



To bring the Fray "All-Angle" milling Attachment Type One up to the working ability of the Types Two and Three, it has been equipped with a ¾ hp heavy duty motor, instead of ½ hp.

Types One, Two, and Three will retain the present wide range of spindle speeds from 375 rpm, to 520 rpm, but the Type Three will be available with back gearing, providing two additional low speeds: 125 rpm and 250 rpm.

Type Four is a heavier unit, designed for use on No. 2 and heavier milling machines, engine lathes, planers, boring mills, etc.

Up to the present time, the Type Four

DRILL JIG

### BUSHINGS

A.S.A. STANDARD types and sizes in stock for immediate delivery.

Excellent delivery on NEW GAGES and GAGES salvaged by HARD CHROMIUM PLAT-ING.

Write today for particulars



\*ECONOMY TOOL & MACHINE CO.

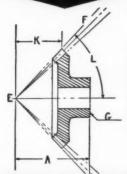
MILWAUKEE 14.

WISCONSIN

### Problem

### Here's the \_\_\_\_\_ and here's the Answer EASY BEVEL GEAR GAUGING

No Long Calculations No Involved Set-up



With Herkimer sine bars and bevel-gear gauges, anyone with ordinary gauging experience and ability to read blueprints can quickly and accurately check all important bevel gear dimensions and relations. Production gauging made easy.

> Write for Free Copy of Bulletin 100



HERKIMER TOOL & MODEL WORKS, 108 King St., Herkimer, N.Y.

### COST CUTTERS



### Machines That Need No Power

• You'll find the Famco Squaring Shear ideal for dozens of light jobs. It's a money-saver—first, because of its low cost; second, because it requires no line shaft, motor or electric current. A Famco shear cuts up to 18 gauge mild steel and is made in 22", 30", 36", 42" and 52" cutting widths. (Three largest sizes have "hold down" attachment.) All have front, back and side gauges. Write today for folder.



Famco Foot Presses for light forming and stamping are available in 10 models (for bench or floor mounting). They are low in cost and upkeep.

Famco Arbor Presses, in 32 models, bench and floor mounting, will deliver up to 15 tons pressure. Require no electric power.

FAMOO MACHINE CO. . 1222 18th St., RACINE, WIS.



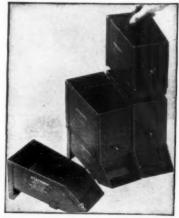
ARBOR PRESSES . FOOT PRESSES
SOUARING SHEARS

attachment has been supplied with a 1 hp motor, but in the future will use a 1½ hp motor. Also, the Type Four attachment has previously been supplied with No. 9 B. & S. or No. 3 Morse taper in the spindle, but the spindle has been redesigned to No. 30 National Standard Taper. The speed range now includes 6 open belt spindle speeds from 375 rpm to 5200 rpm and, in addition, this unit is equipped with two back-geared speeds of 125 and 250 rpm.

A complete line of standard adaptors is available for various sizes of over-arms, and special adaptors will be available to specifications it was announced by H. Leach Machinery Company.

### ADJUSTABLE HOPPER FOR ASSEMBLY BINS

Regulating the flow of small parts in assembly bins is now possible by means of new, sliding-front hoppers announced by Stackbin Corporation, 1085 Main St., Pawtucket, R. I. Such an aid to assembly



line operators will prevent overflows or jamming of parts, saving time and speeding operations.

All adjustments are easily and quickly made. The slide is held in position by a wing nut for convenient adjustment.

The addition of sliding-front hoppers broadens the scope of the Stackbin System created to reduce handling of tools, parts, and materials with resultant saving of time, space and labor.

### NEW PLASTIC ADHESIVE STRONGER UNDER BENDING STRESSES THAN METAL

FATIGUE TESTS given two pieces of of 1/16-inch thick duraluminum cemented together with a new plastic adhesive have shown that the adhesive

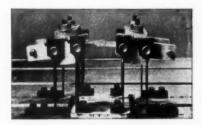


Fig. 1. Top view of the Model SF-01-U universal fatigue testing machine of the Baldwin Locomotive Works, showing the cemented pieces of duraluminum in the fixture that subjected the specimens to as many as five million load cycles.

actually is stronger under bending stresses than is the metal itself. The tests were conducted by the Sonntag Scientific Corporation on a Model SF-01-U universal fatigue testing machine as a part of a series conducted for the American Society of Testing Materials.

Fifteen specimens of the 24ST aluminum alloy were used in the tests. Repeated alternating loads up to five million load cycles were applied to the specimens and in all cases except one the adhesive held while the metal itself fractured. The adhesive parted in only one of the tests. These tests, which simulated actual service, indicate that it may be possible to use the adhesive to glue metal aircraft parts together rather than rivet them. Such practice could materially reduce the surface drag of airplane wings and fuselage. Further data is available from The Baldwin Locomotive Works, Philadelphia 42, Pennsylvania.





Fig. 2. The new plastic adhesive used to cement two pieces of duraluminum together proved to be stronger under bending stresses than the metal itself. In all but one of fifteen tests conducted the adhesive held while the metal fractured.

### LABORATORY GRADED

STAR DUST speeds up pre-duction enormously and pre-duces finishes and super-finishes down to less than .0000004 of an inch.

Precision LAPPING POWDERS for PRECISION work

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN

 Absolute control of particle sizes
 Complete absence of out-size particles
 Complete range of grit sizes There is a STAR DUST Field Serviceman in your territory.



ONE SPRUCE NEW YORK 7, N.

CARBIDE, CHROME.

### Unskilled labor does PRECISION RIVETING

With a Weber Automatic Staking Machine, unskilled operators turn out more kinds of jobs faster and more accurately than any other method. Simple adjustment delivers the right hammer blow for each job whether staking fixed or movable joints. Write for folder.

	Model 1	Model 1-B	Model 2
Stroke	2"	2"	21/2"
Spindle	1"	1"	11/4"
Throat Spindle	43/4"	43/4"	81/2"



DISTRIBUTORS

### WEBER Machine Corp.

Some territories are still open, offering substantial profit possibilities. Write regarding yours.



## Shop Hints

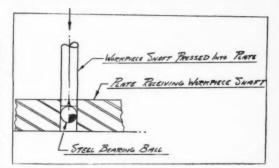
### SIZING A HOLE AND PRESSING SHAFT IN SAME OPERATION

### By Herbert Weitz

Powered pressing of a shaft into a hole can be a very simple matter in production, but it is made even simpler by this little time saving trick. The hole is left a little undersize and when the receiving plate is located under the press ram the ball is dropped into the hole. Since more than half the diameter of the ball is still exposed, the shaft center rests on the ball. The pressure ex-

erted on the shaft forces the ball ahead of it through the hole and burnishes the hole to the size required for a correct press fit.

Since burnishing is not a metal removing operation the surplus metal is crowded back thereby densifying the metal around the hole wall. This reduces the friction encountered and provides more holding area due to the increased



contacting surface. Another friction reducing factor results when the metal is smoothed out in a downward direction. Since the shaft is pressed down in this same direction less pressure is needed to overcome the resistance as compared to the amount of pressure required when the hole walls contain microscopic tool marks which are perpendicular to the direction of shaft descent.

### QUICK CHANGE CHUCK

A new high speed production chuck for drill press and hand power tools which permits quick tool changes with ease and safety without shutting off the power tool, has recently been announced by the Rayco Manufacturing Company, 3911 S. Prairie Ave., Chicago.

Utilizing the principle of centrifugal force to move a ground and hardened driver into the adapter slot, the manufacturer states that the chuck operates in all positions at any speed.

Tool changes can be made in 3 seconds with the power tool operating anywhere in speed ranges up to 20,000 rpm, it is said. Design of the chuck and its adapters makes tool centering automatic. The centrifugal lock and self-centering features of the chuck permit close-tolerance precision work at extreme high speeds.

Considerable savings in production time and costs are claimed for the new chuck by its manufacturers. Send inquiries to Dept. BB of the manufacturer.

### Precision.

### TAPPING

Leads changed in 90 seconds



### M & L

### PRECISION TAPPER

This is a fast rugged production tool capable of sustained accuracy. Flexible and adaptable, it cuts clean screw threads, handling up to 34" in nonferrous metal and 0 to 1/2" in SAE steel. Class 3 and Class 4 gage fits and high production schedule are accomplished in normal operation even with unskilled

Tapping speeds are 95 to 350 rpm with reverse speed twice that of forward speed. Taps are guided by precision ground lead screws which are easily and quickly changed. Bulletin 143 gives full details.

> Dealers' inquiries are invited

### CKINGE

MACHINE AND EXPERIMENTAL CO. 716 N. Highland Ave., Los Angeles, Calif.

### FACE SHIELD

American Optical Company, Dept. BB, Southbridge, Mass., announces a new face shield designed to give extra over-all protection, especially on jobs such as babbitting, handling chemicals and on operations in the manufacture of high octane



gas. The shield also guards against impact of flying particles and splashes of acids, oils, alkalis, hot water, etc.

The extra large window extends completely around the face, even covering the ears. The fibre head guard protects the upper forehead and covers the entire top of the head as an additional safeguard against injury.

The headgear is made for comfort and long wear. The band slides within a fibre sleeve in back, permitting easy adjustment to varying head sizes. A metal knob allows for quick adjustment. In front, leather sweatband absorbs perspiration. Positive friction joints hold the window securely in "on" or "off" guard position.

### MILLING CUTTERS ESPECIALLY DESIGNED FOR CAST IRON

Use of carbides for milling cast iron is now standard practice in most shops. In now standard practice in most snops. In recognition of the popularity of the process, the Super Tool Co., 21650 Hoover Rd., Detroit, Mich., and 4105 San Fernando Rd., Glendale, Cal., has developed a full line of standard carbide tipped cutters in the plain, side, half side, shell and face mill forms. These cutters, available from stock in all standard sizes, are designed specifically for milling cast iron.

For most effective high speed milling, standard inserted blade cutters with solid carbide blades are recommended. High production rates and excellent finish are claimed for these tools. Full descriptive literature is offered by the company.

### CONCENTRICITY CHECKER

The time and effort of checking and inspecting relative concentricities on round parts or sections has previously necessitated the use of conventional V blocks in conjunction with other tools.



The Swanson V-Liner is said to eliminate these complications and tools for this operation. It automatically determines the proper center line heights required for any combination of diameters involved in a work piece. This is accomplished by simply turning a properly compensated screw which raises the vertically adjustable V block on the instrument.

The V-Liner, on which patents are pending, is manufactured by Swanson Tool & Machine Products, Inc. Dept. BB, Erie, Pa, and was developed in the Swanson shops to simplify concentricity checking problems on a miscellaneous variety of close tolerance machine parts. At the present, the V-Liner is available in the Model A size, which can handle diameters varying from  $\frac{1}{4}$ " to 6" in diameter, and from 1" to 24" in length. Models with the same diameter range are also available for handling parts up to 36" and 48" in length.



Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.





High speed, Right hand. 1/2" shank, Diameters from 1/4" to 11/2". Standard sizes in stock for immediate delivery. Complete set
—41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size

### CENTER REAMERS



High speed steel. Reamers from 1/4" to 1" regularly furnished with 60°, 82° or 90° included angle, Specials made to your specifications.



Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from A" to 1" are .0005" undersize at small end, from 1½" to 3", .001" undersize. Immediate delivery.

### Write for Literature

Illustrated literature and prices on all KEO Products mailed on request.

19326 Woodward - Detroit 3 Mich

### PORTABLE CLEANING UNIT

A simple, inexpensive portable vacuum cleaning unit can be constructed by making use of the light weight and flexibility of Spiratube, non-collapsible fabric tubing manufactured by The Warner Brothers Co., Spiratube Div.



In the cabinet-making department of Seth Thomas Clocks, Div. of General Time Instruments Corp., Thomaston, Conn., Spiratube is used to pick up sawdust, shavings and chips and convey them to the main exhaust line. The Spiratube has on its discharge end a sheet metal adapter with lugs which fit into a bayonet slot in the main exhaust line. The intake end of the tubing is clamped to a metal nozzle, on which a metal strap is bolted to serve as a handle.

Spiratube is used on a variety of semipermanent and permanent installations for conveying air, gases and light solids. It is self-extending and retractable. The flexibility of this construction is said to permit extremely sharp turns with minimum crimping and reduction of free area.

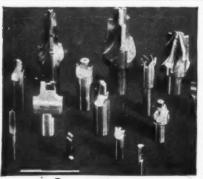
Further information on Spiratube may be obtained by addressing Dept. 157, The Warner Brothers Co., Spiratube Div., Bridgeport 1, Conn.

### NEW GEAR LUBRICANT

A lubricant which is easily brushed or sprayed on open gears is announced by The Texas Company. The new lubricant, called Texaco No. 2-X Fluid, contains a base material which has high adhesiveness, cut back with a non-inflammable solvent. This combination results in a lubricant which is claimed to be both efficient and easy to apply.

For information concerning this new lubricant write to Dept. BB, The Texas Co., 135 E. 34th St., New York, N. Y.

### FORM-GRINDING



.. is our business!

Your own products are your specialty.
 Why not let us form-grind the illustrated types of form flat-drills in which we specialize?

Our entire organization is keenly interested in "Form-Grinding" and its problems. Facilities include J. & S. "Form-Dressers," J. & S. "Form-Grinders," and all necessary form-grinding equipment. The "know-how" developed by supplying some of the outstanding manufacturers in industry, is available for your quality tool requirements—and at competitive prices. Your requests for quotation are solicited on that basis.

Write for booklet or send prints today?

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TOOL CO. 477 Main St., East Orange 2, N. J.

Annufacturers of "Aleidmolion" Radii and Angle Dressers



### MARTIN ROLL FEEDS FIT ALL BENCH TYPE PUNCH PRESSES

Permit High Production at

Extremely Low Capital Costs!

Save in original Die Costs. Precise indexing eliminates half holes. One operator can tend several presses. Available for immediate delivery. We also specialize in the manufacture of Small High Production Dies.

Quotations given promptly upon receipt of prints.
Write for descriptive literature or ask your dealer.

RESCO 2020 SANTA FE AVENUE

### QUICK-ACTION VISE

A completely new quick-action heavy duty vise is announced by Grand Specialties Co., Grand Ave. at Troy St., Chicago 22, Ill., manufacturers of the Grand line of quick-action vises and "C" clamps.

Known as the Grand Vise Master, this general utility speed vise is claimed to incorporate many outstanding advantages. It is described as closing instantly with push on free jaw, and opening automatically by trigger release on its spring action.

In addition, this heavy duty speed vise is equipped with "Double Bite" steel pipe jaws which are integral with the body to eliminate time required to adjust loose jaws to pipe or tubing. The "Double Bite" is said to be an exclusive feature consisting of double pipe jaws in back to prevent "whipping."

Another feature claimed for the Vise Master is that it completely revolves full 360° on base with double swivel, friction type, lock-up which fastens from both sides and securely holds the desired swivel position.

The special spring and screw action is claimed to completely eliminate the socalled "slack" in main tightening screw and to provide a balanced precision grip. The vise automatically opens to full 4% inches by pulling on the trigger after tension is eased by slight turn of handle. It is claimed that vise is then ready without further adjustment for instant closing on any other work.

Weight is approximately 23¾ pounds. Length with jaw open 17½", closed 13". Width 7½". Height 7¼". Max. opening 4¾". Width of jaws 3½". Write Dept. BB.

The new Cherry G-55 Hand Gun was designed especially for small-quantity users of the larger sizes 7/32", ½" and 9/32"—Cherry Blind Rivets. When used with an adapter, it also installs the smaller rivets. The more expensive pneumatic guns are primarily production line tools. But for small-quantity rivet installation, or for field work where air pressure is not available, the hand gun is more practical.

This Hand Gun operates on the ratchet principle. It is 29 inches long, including the pulling head, and weighs 4½ pounds complete with pulling head.

For further information, write the Cherry Rivet Co., Dept. BB, 231 Winston St., Los Angeles 13, Calif.

### SAFETY SCRIBER



Recedes back into handle when not in use.
Hardened Steel Replaceable Points — Also—
Hardened Steel Knife Blade included in Unit—
Send \$2.00 Complete. Carbide Tips \$1.00 additional.
(WE16 HT—LESS THAN ONE OUNCE)

MARK SPECIALTY CO.

406 Temple Bldg. Rochester 4, N. Y.

### SALES MANAGER

Experienced: Sales of Machine Tools, Metal Fabricating Equipment. Sales Prometion, organize territories, quotas, systems, reports, customer correspondence, engineering Sales letters. Assume direct charge of Salesmen.

An excellent opportunity with a Chicago concern for an aggressively active sales organizer and Manager.

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### ERRINGTON MECHANICAL LABORATORY STAPLETON, STATEN ISLAND 4. N. Y.

6701 N. SIOUX AVE., CHICAGO



ADJUSTABLE MULTIPLE

SPINDLE DRILLING HEAD

Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable
Spindles



### PERFORMS MANY SMALL JOBS WITH SPEED · · · ACCURACY

Fixed-Center Auto-Reverse Multiple

Tapping Heads

Fast setup and quick changeover are necessary if you are to profitably perform the many small jobs requiring milling and jig boring . . . on dies, jigs, fixtures, patterns and models. And you will also need these other features Linley provides . . . 8 spindle speeds to 4250 r.p.m.; direct micrometer setting; velvet feed; grease-sealed bearings; ample  $(7'' \times 171/2'')$  table size; small floor area  $(181/2'' \times 20'')$  . . . which with the Linley's compact, careful design, contribute to precision work at high speeds.

Get Bulletin . . . now.

### LINLEY BROTHERS

663 STATE STREET EXTENSION BRIDGEPORT 1. CONNECTICUT



# Sous Talk Shap

### V-BLOCKS FOR JIG VISE

A new feature has been added to the Universal Jig Vise of J. M. Short & Associates. This is an interchangeable V-Block which will fit inside the jaws of the vise. By the use of this feature the versatility and the holding power of the vise is greatly increased. Round stock may now be held with relative ease.



The V-Block consists of two sections of Machine Steel. Each block has a long and a short 45 degree angle which are placed together to form an interchangeable V-Block for clamping and holding round and irregularly shaped work pieces to be cross-drilled, reamed, tapped or machined.

Instant clamping by means of a lever is stated as one of the outstanding features of this system. This is to eliminate the need for use of such tools as wrenches to tighten and loosen set-screws or bolts each time a piece is changed.

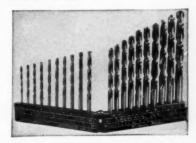
The original vise has been on the market for some time, but the V-Block is a recent addition to it. Descriptive matter is available by writing the distributors, J. M. Short and Associates, Dept. BB, 53 W. Jackson Blvd., Chicago 4, Ill.

### FOLDING DRILL STAND

The Geneva Manufacturing Company, of Montrose, Cal., announced the introduction of their Drill Stand to the market.

This stand holds the drills firmly and can be folded so that it fits easily into a limited space. This feature is intended to be of special value to such persons as machinists, since it allows easy handling and eliminates the need of putting drills loosely in a kit.

Under each drill the decimal, tap and drill sizes are shown. This is to eliminate the need for referring to drill tables while on the job.



Write Dept. BB of the Geneva Mfg. Co. for more information.

### DUAL DRIVE LATHE

A new lathe with dual driving mechanism has just been announced by the R. K. LeBlond Machine Tool Co. Known as the LeBlond Dual Drive, it is built with two separate driving arrangements, a gear drive, and a direct belt drive. It swings 15" over the bed ways, can be built with center distances starting at 30", and is powered by a 3 hp main drive motor.

According to company officials, the new

lathe is intended to augment the LeBlond line, and to fill the gap that previously existed between the Regal and heavy duty models.

The Dual Drive lathe offers 12 spindle speeds, four of which are high speeds for use with carbide tools.

The 12 spindle speeds are controlled by a single lever. This is fitted with a subdivided plate containing the spindle speeds, and an arrow for quickly guiding the lever to the desired speed. The spindle and drive shafts run on anti-friction bearings, and the shafts run in oil provided by an automatic forced feed lubricating system.



The quick change feed box is totally enclosed, and the gears are lubricated by oil pumped automatically from the main reservoir.

The electrical control panel located on the head end leg contains main drive motor, start-stop push buttons, and drum switch for pre-setting direction. This panel is completely wired and fitted with coolant pump start-stop push buttons, so that pump and piping may be added as extra equipment at any time.

A multiple disc clutch and brake with 2-station control, multiple automatic length stops, and a chip pan are furnished as standard equipment.

The standard equipment furnished consists of a reversing type 3 hp, 1800 rpm motor, vee-belt motor drive, start-stop push button control, wiring in approved conduit; large and small face plates, steady rest, graduated compound rest, tool post, taper spindle sleeve, standard No. L00 taper spindle nose, chasing dial, ad-

justable thread cutting stop, multiple automatic length stops, cabinet legs, chip pan, centers and necessary wrenches, lag screws and washers.

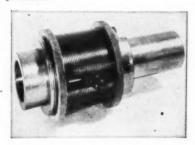
For detailed information about the new Dual Drive lathe, address The R. K. LeBlond Machine Tool Co., Dept. BB, Cincinnati 8, Ohio.

### HOLDER FOR THREADING OPERATIONS

The Mosley full-floating holder is designed to meet the most exacting requirements and specifications in all threading operations. It is a hardened and ground precision tool of tough quality, steel thruout, and so constructed that it is adaptable to drill presses, Bullard Automatics, P. & J. Automatics, Aeme-Gridley Automatics, New Britain Automatics, and Conomatic Automatics, as well as most types of hand operated screw machines.

This holder has been developed thru years of research and experience, and is designed to take the "guess" out of threading operations and save valuable production time and material.

It is not a cure-all for your threading problems but is so constructed as to minimize many of the causes of these problems.



The Mosley holder was not made available to industry until it was extensively tried in actual production by many manufacturers, such as the Easy Washing Machine Co., Ross Metal Products, Eastern Engineering Co., and the Self-lock Co. A period of twelve years has elapsed since the idea and principle of the holder was put on the drafting board and the actual holder commercially made available to industry.

Write to Mosley Mfg. & Sales Co., Dept. BB, Syracuse 3, N. Y.

### TOOLS WITH SAPPHIRE

The Sapphire Products Division of the Elgin National Watch Company, Dept. BB, 932 Benton St., Aurora, Ill., now offers a wide variety of gages and other precision industrial tools of sapphire, as follows: Left to right, 1—hand burnishing tool, 2—sapphire tipt-type cylindrical plug gage, 3—cylindrical plug gage, with

solid sapphire member, 4—cylindrical plug gage with sapphire inserts, 5—cylindrical plug gage with solid sapphire members, 6—flat plug gage, 7—needle valve gage, 8—cylindrical plug gage with solid sapphire members.

Also offered by this company but not



shown here are ring gages, single and double styles, mounted in gold-plated brass or in plastic; burnish-polishing tool—used chiefly in the watch repair business as a pivot polishing tool; sapphire-tipt dial indicator contact points; Many others which are manufactured to customer's specifications.

### HOW TO SHARPEN DRILLS

Republic Drill & Tool Co., 322 Green St., Chicago 7, Ill., has published a 24page manual on the correct principles of sharpening twist drills. The manual contains detailed data on the proper care of twist drills and gives a number of pointers on sharpening and web thinning as well as dimensions and angles of proper points for best results in drilling various materials. Request Manual G-1 from Dept. BB of the Republic Drill & Tool Co.



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### - FAST ACTION

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- \* The device of α thousand uses in work handling operations. Reduces fatigue
  . . . speeds production . . lowers cost
  . . . simplifies jig design.
- ★ True-bore cylinders . . . non-rusting cylinder heads . . . oilless bronze bushings . . . tough, durable, precision-built.
- tough, durable, precision-built.
   ★ Unconditional guarantee . . lifetime factory service plan.

Write for Complete Data and Prices

### AIR-TROL

2651 West Lake St., Chicago 12, Illinois Representatives: Some territories open, Write!

### AUTOMATIC PERFORMS 16 OPERATIONS

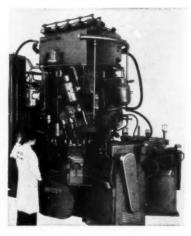
A special-built automatic by which auto connecting rods may be milled, sawed, drilled, reamed, tapped, countersunk, counterbored and burred has been built by Snyder Tool & Engineering Co., Dept. BB, 3400 E. Lafayette, Detroit 7, Mich. The drop-forged steel conn rods are machined complete except for bearing cap joint faces and crank and wrist pin holes.

Machine is center column construction, and dual work - holding fixtures are

mounted on a 12-station power driven Geneva index table. Production of 266 rods per hour, is claimed.

Standard and special machining units have individual motors and drive thru a change-gear box and V-belts. They are hydraulically fed except tapping head. High speed steel tools are said to operate at 60 surface fpm, and tapping at 30 or 40 fpm.

Control panel includes cycle start but-



ton, emergency return button for withdrawing all units from work, and individual unit cycle buttons which permit tool set-up. Coolant is pumped from a central unit, and all lubrication facilities are readily accessible for servicing.

### Save Space and Lifting

Yohe Rarks take less floor spacehold more stock and require less lifting. Four arm rack, 51" high stacks, 10,000 lbs. Five arm rack 5?" high holds 12,000 lbs. flat or round stock—at safe lifting heights. Use against wall or back-to-back in center of room.

Let us send details and prices.

WM. S. YOHE SUPPLY CO.

503 Mahoning Rd., N.E. Canton, Ohio



### INDUCTION HEATERS

The new Weltronic induction heaters, now offered to the metal working industries, are furnished, when so desired, complete with all auxiliary equipment. Thus these units are adapted to the particular production problems and requirements, thereby relieving the customer from additional work and responsibility.

To supplement the induction heating line Weltronic will design and build any auxiliary equipment required to complete the individual production problems including work coils, work tables and fixtures. This service is offered to simplify the engineering problem where trained induction heating personnel is not available.

These units are particularly adaptable for hardening and heat treating parts such as gears, tools, dies, gauges, cams, bearings, shafts and rods. Also adaptable for silver or copper brazing, soldering, forging, piercing and melting.

Weltronic Bulletin WTIH20 lists the applications and advantages of this unit. Write Weltronic Co., Dept. BB, 19500 W. 8 Mile Rd., Detroit, Mich.

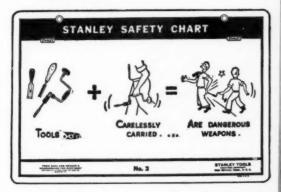
### SAFETY CHARTS

To help prevent accidents in industrial plants, and to stimulate interest in safety practices among plant employees, Stanley Tools has prepared a series of thirty-six Safety Charts. Each chart gives one complete safety message.

Illustrations for the Stanley Safety Charts are humorous drawings, enlivened by color and accompanied by brief wording. Mounted on both sides of heavy cardboard, each chart measures 18" x 12". Charts have

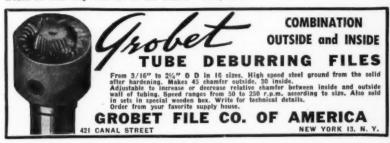
two metal grommets at the top to permit hanging on hooks, if desired. Surfaces of the charts are lacquered so that they may be cleaned easily.

It is suggested that one or two of the charts be displayed on the safety bulletin board, or elsewhere in the plant each week. In this way one set of the charts



can be used for several months or more without duplication.

Stanley Safety Charts are offered to industrial plants at the cost of printing and postage, \$2.50 per set anywhere in the U.S.A. Write to Stanley Tools, Dept. BB, Educational Department, New Britain, Conn.





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SPEED REDUCERS Ask for Catalog

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### AIR POWERED ARBOR PRESSES

Two new air powered all steel welded construction arbor presses, the Hurri-cane Six and the Hurricane Eight are announced by the Studebaker Machine Co., 1221 S. 9th Ave., Maywood, Ill.

Double acting air cylinders are used on both models. The Hurricane Six develops one ton ram pressure on the down stroke at 80 lbs. air line pressure and one ton on the up stroke. At 120 lbs. air line pressure the Hurricane Six develops 11/2 tons ram pressure on both the down and up strokes. The Hurricane Eight develops two tons ram pressure on the down and

up strokes at 80 lbs, air line pressure and three tons at 120 lbs. air line pressure.

The ram pressure can be pre-set from a few pounds to the maximum and the stroke can be regulated from a few thousandths to six inches.

These presses are especially suited for light push or pull broaching jobs as well as for fast assembling, stamping, forming, riveting, punching, cutting and other punch press operations.



Bulletins, prints and more detailed information are obtainable upon request to Dept. BB of the manufacturer.

### SUPER-SENSITIVE DIAL INDICATORS

The B. C. Ames Company, 28 Ames St., Waltham 54, Mass. announces the man-ufacturing of a new series of extremely sensitive and accurate master checking dial indicators, called the "Super". The



FOR JIGS, FIXTURES, DIES, GAGES, TOOLS AND MACHINERY Hand Knobs, Quarter Turn Screws, Spherical Washers, "C" Washers, Jig Feet - Locating Keys Write fer Catalog No. 2 Inquiries for Tool Die and Mold Estimates Invited.

GEORGE F. BUB AND SON



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO. 102-105 Lafayette St., New York, N. Y.

overall bevel diameters of the new models are those of the Ames 200 and 300 series,  $2\frac{1}{4}$ " and  $2\frac{3}{4}$ ", respectively. The graduations are .0001". The range is .008"- with the dial either balanced (4 - 0 - 4), or

for other jobs where accuracy is needed. A variety of backs, to suit the desired mounting, is available.



continuous (1 - 0 - 8). Every bearing is jeweled.

The Ames Company reports that the new indicators are being used as a master check both in the toolroom and on the production line. With a diamond contact, they are also used as surface analyzers to check trueness and finish of ground surfaces, chatter of tools or work, and

### NUMBERING HEAD

Wm. A. Force & Company of 216 Nichols Ave., Brooklyn 8, N. Y., announces a new design of selective type indenting numbering head for use on metal.

This new design known as Model 27 incorporates all of the well-known features of the standard automatic Numbering Head except for the action. In place of the automatic consecutive action, each wheel is controlled by an individual lever individually operated to secure selective numbers at the will of the operator. One number is advanced on each wheel for each depression of its respective lever thus allowing the operator to set the numbering machine to any combination which the wheels are capable of printing.

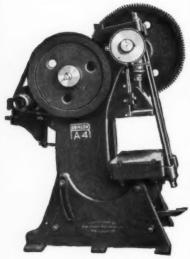
Wheels are indexed for direct reading of the number in the printing position so that the operator can tell at a glance whether or not the correct number is to be printed.

While developed for use on lock cores



THE NICHOLS ENGINEERING COMPANY ...

### Long Recognized for durability strength and service



● The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

Send for descriptive Bulletin No. 7.

New Albany Machine Mfg. Co. New Albany, Indiana, U.S.A.



and keys, the unit is adaptable for any small metal parts on which the numbering does not follow in direct sequence but which requires frequent changes.

Now available in six wheel capacity in

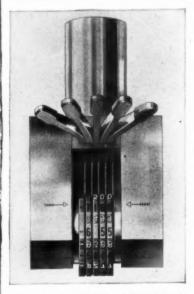


figure sizes from 1/16" to 3/32". Write for further information; refer inquiries to Dept. BB.

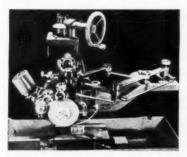
### COMBINATION MACHINE

Pantographic diamond form wheel dressing and roll crushing are now combined in a single machine, the Moore Panto-Crush Wheel Dresser, developed by the Moore Special Tool Company, 728 Union Ave., Bridgeport, Conn.

The 2-in-1 Moore Panto-Crush Wheel Dresser consists of a high-precision pantograph, working directly from a template plus a power-driven roll crusher, both mounted together and accurately related to the spindle. The combination is said to result in a high degree of ultimate precision and economy.

The principles embodied in this device

may be employed, within reasonable limits, on any type of grinder, either cylindrical or surface, on a wide variety of circular or linear form grinding. Either wheel dressing method or both may be immediately employed to suit the par-ticular job to be done. The operator may readily switch from one method to the other without disturbing the workpiece setting or the location of either truing device. It is not necessary to raise or lower the wheel spindle for dressing the wheel



The Moore Pantograph has a 10-to-1 ratio between the follower or stylus, and the diamond tool, both accurately interrelated. Maximum width or depth of contour capacity is determined by practical grinding limits, rather than by the size of the device. Contours %" wide may be formed without extending template beyond the table.

The power-driven crusher roll drives the wheel spindle by friction. The wheel is large in diameter, and very little torque is required to turn it. This action produces true rolling, yet does not require any auxiliary slow-speed drive for the grinding spindle. The crusher roll may be re-ground as often as necessary to maintain true form, or whenever it is removed or replaced.

### BLOCKS USED IN SNAP GAGE

A new type snap gage incorporating the use of special gage blocks as accurate, non-wearing spacers in working, inter-changeable assemblies has been an-nounced by Dearborn Gage Co., Dept. BB, 22038 Beach St., Dearborn, Mich.

The new snap gage, known as the Ellstrom "Mastersnap", consists of a spe-



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JOHNSON FIREBOX Hi-Speed No. 130A 73/4" high 13" wide 161/2" long

For quick, low cost heat treating high speed steels, dies, and tools. Reaches operating temperature FAST to save time and gas. Gets the job done before conventional type furnace warms up. Lined with high temperature insulating refractory. Counterbalanced door the properation of Write for tory. Counternalanced door opens upwards. 4-Burner Unit shown for temperatures 1400-2350°F. 6-Burner fer 1800-2400°F. Complete with Carbofrax hearth, 6. E. meter and Jehnson Blower. Complete Literature

> 4-Burner \$295.00

6-Burner .....\$325.00

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cial gage block wrung between a pair of chromium-plated special alloy-steel jaws and locked in position by brass thumb fasteners.



By this arrangement, according to the manufacturer, the special gage blocks are not subjected to wear and may be used indefinitely without loss of original accuracy. It is also reported that, by finishing the jaws separately, true flat chromium-plated gaging surfaces are assured.

Special gage blocks for the "Master-snap" are available in sizes from .050" to

2.000" inclusive. They may be used separately or in combinations to form a wide range of double-end snap gage sizes. Separate "Mastersnap" assemblies are required for the "GO" and "NO GO" combinations.

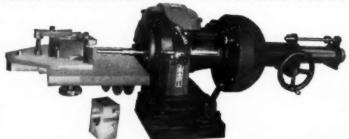
### "V-EIGHT" GRINDING WHEEL

A new "V-Eight" grinding wheel has been announced by American Emery Wheel Works of Providence, R.I. The new wheel, said to be different from any wheel now on the market, is similar in structure to the porous wheels which have been widely used in recent years. It is claimed that it holds its corners even under extremely heavy cuts and performs efficiently in dish and cup shapes.

The manufacturer states that users report good results on production work and in the tool room: such as 0.12" cut on hard steel, Rockwell 60C without loss of corner; .030" cut on soft tool steel; .040" cut on oil-hardened tool steel—and many other heavy cuts on difficult materials. The "V-Eight" wheel held its corners on these jobs.

Further information regarding this new development may be had by writing Dept. BB of the manufacturer.

### HYDRO-BORER CAN DO A BETTER BORING JOB FOR YOU



Model C-4F with special fixture for Industrial use. In operation shown, Hydro-Borer is boring and counter boring two holes at 14° angle in 14 ST Aluminum. Size of bore +0.005.

-0.000, length 3-1/4". Special or universal work-holding devices are readily designed

.020 \_\_0000, length  $5^{\circ}$ /4 . Special of universal work-holding devices are readily designed and built for mounting on the Hydro-Borer. Many operations possible on these versatile, accurate machines. Eccentric boring head, calibrated, permits advance in bore up to .014 without resetting tool. Bores from  $\frac{1}{2}$ % to 5" diameter by  $5\frac{1}{2}$ %" spindle travel. Other models for Automotive and Aircraft application.

Write us for engineering information on your boring problems.

### **HYDRO-BORER COMPANY**

A DIVISION OF SOUTHWESTERN DEVELOPMENT CO.

214 W. Orange Grove Ave. Burbank, California (Los Angeles County)



### ELECTRIC HAMMERS

Make Short Work of Drilling — Cutting — Chipping in concrete and masonry

Anchor bolt holes to set up machines — mount shaft hangers — channel for conduit — and a hundred other jobs around the plant.

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SYNTRON CO.

300 Lexington

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3600 BLOWS PER MINUTE

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Specify

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HIGH TORQUE

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PRECISION BUILT

LONG WEAR LIFE

EASY ADJUSTMENT

ROCKFORD PULLMORE

**MULTIPLE-DISC** CLUTCH

These compact, powerful, multipledisc clutches are helping product engineers reduce size and weight between the driving and driven units of machine tools, lift trucks, overhead cranes and a wide variety of other equipment. Readily fit into product designs, accommodating great torque capacity within small size. Precision grinding insures perfect fit on the shaft.

Send for This **Handy Bulletin** 

Shows typical installations of ROCKFORD CLUTCHES

and POWER TAKE-OFFS. Contains diagrams of unique applications.



Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION WARNER

1309 Eighteenth Avenue, Rockford, Illinois, U.S. A.

### LATHE BORING TOOL

A lathe boring tool that will remove material at far less than the average time of ordinary types of tools is the claim for the "Tru-Bore".

The holder is designed for two boring bars of different diameters, thus a heavy and light bar may be ready for use. Since rigidity is a prime factor in internal threading or boring, the "Tru-Bore" utilizes the entire area of the compound rest for the support of the boring bar.

When in operation the bar being used may be adjusted to the desired depth while the other is set clear of the work to complete a full clamping effect.

The "True-Bore" is designed for all makes and sizes of engine lathes. For special cases it will be made to suit lathe specifications without added cost.

Whenever it becomes necessary to machine the outside surface of diameters larger than will swing under the carriage, a problem is usually faced with many tool-post holders. Extra utility is claimed here for "Tru-Bore" because the strong, large diameter bar will take heavy and finish cuts without chatter and is reported to produce a fine finish.

Deep boring, when performed with bars of light construction and insufficient support, causes a chattering cut of improper finish taper holes, and often it is necessary to use slow speeds. Operations of this nature require bars that project a considerable extent, which calls for rigidity plus. This can only mean a tough, husky bar fully supported, skillfully hardened for maximum rigidity and clamped solidly on the full surface of compound rest.

With a solid set-up of this making, speeds can be increased, heavier roughing cuts permitted and finish cuts that reflect smoothness and accuracy. The manufacturers state that their lathe boring tool meets all of these requirements and that it will prove of value wherever

For more information on this write to Dept. BB, Oliver Motorcraft Corp., 2532-34 S. Wabash, Chicago 16, Ill.

### NEW SPRAYWELDER

A new type of powder metalizing unit, the Colmonoy Spraywelder, has just been announced by Wall Colmonoy Corp.

This was developed for use in conjunction with the Colmonoy Sprayweld Process. With this new unit it is claimed possible to combine the advantages of both welding and metalizing procedure. The unit is operated in the first part of

# Adaptable to Milling of parts of various shapes and sizes . . . SLOTS 2 SIZES AT ONCE. TWO CONTINUOUSLY OPERATING CONVEYORS. AUTOMATIC BURR REMOVAL . . AS HIGH AS 3000 SLOTTED PARTS PER HOUR. PELLOW MACHINE Co.

the process as a powder metalizing unit. It is then used as a conventional welding torch to fuse this sprayed overlay to the base metal to obtain a fusion or molecular bond.



There are only two control valves, both being mounted on the gun. Once adjusted, the powder flow is entirely controlled by the trigger. It may be hand operated, or held in a vise or with an attachment in the tool post of a lathe. While primarily designed for spraying

Colmonoy alloys, it will handle other powdered compositions equally well.

The Spraywelder unit consists of the gun, all necessary hoses, with connections. The hopper for the powdered metal and the carburetor are combined in a single unit. In addition a panel to hold all the equipment is provided. Full information on this new unit may be obtained from Wall Colmonoy Corp., 7th Floor Fisher Bldg., Detroit 2, Mich.

### CAST CARBIDE AVAILABLE

Cadmet is the name of a new cast carbide now available in a full range of tool bit sizes, in circular form tool blanks, and for making dies, bushings, bearings, gauges and similar products.

These tool bits are reported to have been run successfully at speeds and feeds from 1½ to 4 times those possible with usual high speed tools. Like steel, it can be cast into full length bits without great danger of breakage. It cannot, however, be heat treated.

Write to Casting Development & Manufacturing Co., Dept. BB, 4505 Wayne Ave., Philadelphia 44, Pa., for complete information.

### "MODERN" VISES ...

are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

### CAM VISES ...

Jaw dimensions: width 4" or 5", depth  $1\frac{1}{2}$ ", maximum opening 2" or 3".

### SWIVEL VISES ...

4", 5", 6".

Write for folders

MANUFACTURERS OF PRECISION
HIGH SPEED STEEL
AND CARBIDE CUTTING TOOLS.

### MODERN TOOLS

BERLIN, CONN.

Manufacturers of precision high speed steel and carbide cutting tools.



### TO RAISE PRODUCTION CUT COSTS

### THE READING BROACH KEYSEATER



The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast—capacity from 1/8 to 3/8 cutter. Low first cost—prompt delivery.

### READING MACHINE CO.

READING (CINCINNATI) OHIO

### CONTROLLING DRILL SHARPENING

Automatic dial control is claimed as an exclusive feature of the Majestic Drill Sharpener.

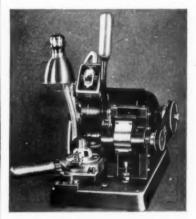
By twisting the dial to correspond with the size of the drill the sharpener is automatically set for the correct grinding angle. It can handle drills from 5/32" to 1", straight or No. 2 taper shank drills.

The Sharpener is designed to fit any grinder and may be adjusted for grinding of hard or soft materials. The manufacturer reports that drill breakage is reduced to a minimum.

For specifications, prices, etc., write Dept. BB, Majestic Drill Sharpener Co., 1100 Second Ave., So., Minneapolis 2, Minn.

### MILLERS AND SETUPS

A contribution to the problem of postwar tooling on both new and old products is being found in Hand Millers and Fixture Setups manufactured by the H. B. Rouse & Company 2216 N. Wayne Ave, Chicago. These units are highly advantageous in forming the basic fixture for



a tooling job. In some cases the only additional equipment is a final holding device.

The manufacturers report that a number of plants today are using 25 to 30 units in battery installations.

### VERSATILE VISE

To meet the need of fast production shops, it was necessary to develop a vise with a fast but smooth gliding action that



will not come up with a bang. The Bryant Co., claims to have developed such a vise and incorporated a new principle that smoothly moves the jaw up to the work, then holds it in a positive grip until released.

Different kinds of cutters can be mounted in place of the standard jaws for trimming of sheet metal, leather, rubber, wood, aluminum castings and plastics. Air pressure—4000 lbs. with 100 lbs. of air (40 to 1 ratio). 300 lbs. pull back pressure on jaws. Air pressure-Full capacity obtained with 1/2 hp compressor.

The inside of the cylinder is hard chrome plated. The piston rod is also hard chrome plated to give long and hard service. To insure easy operation, they have equipped this new "Presvise" with a toe touch 3-way foot valve.

This new tool can be used for holding, punching, forming, etc. The movable jaw can be quickly adjusted to fit the desired job. The jaws can quickly be changed to pipe jaws, punches, dies for forming circles, squares and rectangles,

Dies may be had for forming 90 degree bends up to 12" wide depending on the



thickness of the material. For vise work. it may be had with smooth jaws, serrated jaws, pipe jaws and jaws that are not

### ACTURE CONTROL HERE'S THE CORRECT ANSWER TO ALL YOUR SMALL DRILL GRINDING PROBLEMS

### BLACK DIAMOND DRILL GRINDERS



### FOR SMALL GAUGE AND FRACTIONAL DRILLS

Quantities of small gauge and fractional drills can be kept sharp and always ahead of produc-tion demands when a Black Diamond Drill Grinder is on the job.

is on the job.

No need of using skilled labor for grinding small drills because anyone can operate a Black Diamond, keep all drills properly ground with true centres and uniform lips, at the proper angle and correct clearance for fast cutting,

and correct clearance for fast cutting.
Black Diamond grinding insures precision drilling, reduces drill breakage, saves expensive drill stock, cuts drilling time to an absolute minimum. The built-in Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crankshaft points.

Moderately priced, a Black Diamond also cuts grinding costs 50% or more, quickly pays for itself in savings, wherever small drills are used

in quantities.

Write for more complete details.

BLACK DIAMOND SAW & MACHINE WORKS, INC. **45 NORTH AVENUE** NATICK, MASSACHUSETTS

### New BELT SANDER The Woods Model "40"



For METALS RUBBER PLASTICS



WOOD & GLASS



EASILY ADJUSTED FOR EITHER HORIZONTAL OR VERTICAL OPERATION

- PERFECTLY BALANCED PULLEYS
- 5"x81/2" WORK AREA, 36" BELT

A husky ball-bearing sander and tool grinder built for maximum efficiency, smooth operation and long life. Reversible platen usable on either face. Dealer inquiries invited.

WOODS ENGINEERING CO.

hardened. For special jaws, forming dies, cut off dies etc. send part or print for quotation,

Any pressure may be set by the regulator valve. Adjustment of two screws positions it.

positions it.

The new "Presvise" is a combination of a portable, fast production vise, welding positioner, and a 2-ton press combined in one tool.

For more information write to Dept. BB, Bryant Products Co., Jackson, Mich.

### TOOL AND CUTTER GRINDER

The machine shown here is the Oliver Heavy Duty Ace Tool and Cutter Grinder. It is an adaption of the standard Oliver Ace Tool and Cutter Grinder intended for the heavier work of gumming and

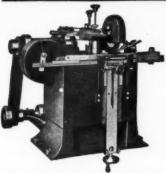


gashing cutters and for use in grinding cutters tipped with Tungsten-Carbide. It retains all the desirable qualities of

It retains all the desirable qualities of the previous machine, but is equipped with a much heavier ram, larger ram bearing, a heavier motor and a heavier spindle. The trame has also been increased in weight and everything done to insure vibrationless grinding.

The New Oliver Ace Tool and Cutter Grinder is manufactured by the Oliver Instrument Company 1408 E. Maumee St.,

Adrian, Michigan.



Wardwell Model E.C. Combination Grinder warawes: mocel E.C. Combination Grinder The only single unit grinder adaptable for hack, band and circular saws that does not depend on the shaps of the grinding wheel to form the shape of the tooth. This unlique feature enables operator to grind a variety of blades without dressing or changing wheels.

### if your metal saws don't hold up .

### LOOK TO YOUR SHARPENING METHOD

Temper toughness and cutting ability of metal cutting saws is affected by the care used in sharpening. When precisely ground, each tooth will take the maximum bite with minimum destructive effect on teeth. Proper sharpening of even as few as 2 gross blades will pay for this grinder through savings of labor and material. Adaptable for circular, hack and band saws.

WRITE FOR DETAILS

MANUFACTURING WARDWELL MANUFACTURING CO. 3165 Fulton Rd., Cleveland 9, 0.



At last..a light punch press for large jobs!

20 TON CAPACITY! 3 INCH STROKE

7 INCH SHUT HEIGHT Designed to meet war production needs, this new Highland all steel punch press is now available! Because of its long stroke, 3", and its ample shut height of 7", this punch press handles those lighter tonnage jobs which heretofore had to be run on larger presses. The new Highland inclinable punch press features a 12" x 12" bolster with a 41/2" diameter plug as standard equipment, an open back, a non-repeating trouble free clutch, and heavy bronze bearings. The highly stressed parts are made of 4140 alloy steel machine finished and heat treated to optimum tensile strength. The frame is made of welded and normalized I" steel, heavily reinforced. A slight modification in the clutch mechanism will allow for automatic operation at 120 strokes per minute. The entire press occupies approximately 31/2 square feet of floor space and weighs 800 lbs. (less motor).

Write today for illustrated folder and further information -

HIGHLAND ENGINEERING CO.

### PROTECTIVE COATING

Wm. A. Force & Co., Dept. BB, 216 Nichols Ave., Brooklyn 8, N. Y., have developed and are now supplying their steel marking tools and dies with new ebony



finish. This glossy black finish is a protective coat for prevention of deterioration and corrosion of the tool.

In addition, in order to protect against accidental marring of the face of the engraved characters, a transparent plastic coating insures against any possible damage before use.

### RADIUS GRINDING FIXTURE

The new Hill Radius Grinding Fixture made by Hill Machine Co., Dept. BB, 1032 Mulberry St., Rockford, Ill., is claimed to



make it easy to grind radius side milling cutters to a true radius thru any arc up to 180 degrees, blending the radius into the straight lands. It takes cutters up to 6" diameter.

The fixture is mounted on a standard

### MACHINE TOOL DRIVES



WITH SELECTIVE SPEED GEARED TRANSMISSION

"It's the transmission that makes the drive."

There is a model DRIVE-ALL for all kinds of machines requiring either one or several speeds—including automatic screw machines.

COMPLETE MOUNTING BRACKETS.

Write for complete information.

DRIVE-ALL MANUFACTURING CO. 3400 Conner 14, Mich.

tool and cutter grinder and holds the cutter in the proper relation to the grinding wheel. A straight grinding wheel is used with the face of the grinding wheel dressed parallel to the table of the grinder and the entire face of the wheel is used to avoid wearing a groove and to make repeated dressing unnecessary. A gang of cutters can be ground with one set-up to uniform radius and diameter.

Convenient graduated adjustments provided for radius, clearance angle, arc, alignment and feed. Diamond dresser and gage also furnished.

### SHAPER

Production of a new 7" Shaper of advanced design is announced by Logan Engineering Co. A companion item to the Logan Lathe, the new shaper is quickly and easily set up to handle a wide variety



of work, including straight cuts, angular cuts, squaring, machining and slotting operations. Built entirely of steel and cast iron, with extra weight at vital points, and rugged thruout, the Logan Shaper is said to take heavier cuts smoothly, with speed and accuracy, and without chatter. An extra heavy cast iron crank plate, for example, puts power behind every stroke. Positive, slip-proof operation, even on heavy cuts, is further



You need low-cost OPTI-LOCATOR!

### OPTI-LOCATOR -

Visually aligns reference marks to axis of spindle rotation.

- Corrects for spindle runout.
- Makes all locating problems simple, accurate, positive.
- Can be used on any machine tool for greater precision in boring, measuring or locating.





Write for Free Folder illustrating simple operation and many uses!

### THE BENTON CO.

DEPT. H, 351 S. LA BREA AVE., LOS ANGELES 36, CALIF.

MANUFACTURERS OF OPTI-TOOLS

# Power Facing and Boring with ONE Tool Head

CHANDLER DUPLEX

- All operations in one set-up.
- 2 For Jig Borer, Drill Press, and Milling Machine.
- 3 Power feed engaged and disengaged instantly.
- Adjustment for boring made in increments of one-tenth.
- 5 Cutting bar takes any position in Tee Slot of Slide.
- 6 Power feed for facing assures smooth, uniform movement of tool across work.
- 7 Any style shank available. Shanks are interchangeable.

Precision Constructed: feed screw and worm gear ground from solid; bronze feed nut and bushings.

Write for complete information Profitable territories open. Prompt Delivery. STANDARD MODEL "D" Slide Travel 1" Boring Capacity 8". HEAVY DUTY MODELS

MODELS
3 sizes of slide
travel 2-1/2",
3-1/2", 4-1/2"
Boring Capacky 26".

### CHANDLER TOOL CO.

514 OHIO AVE., MUNCIE, IND.

assured by the roller chain drive.

A maximum stroke of 7%" and any desired operating speed between 64 and 175 strokes per minute are stated to make the Logan Shaper outstanding in capacity and versatility as well as in accuracy. The speed can be changed instantly, without stopping the motor or shifting the belt. The ram is micro-set by a simple screw adjustment.

There are six automatic feeds in either direction from .002 to .012, with a half turn of the feed handle reversing the feed. The tool head may be swiveled and instantly re-set to center by means of tap red locating pins, an exclusive Logan Shaper feature, according to the designers.

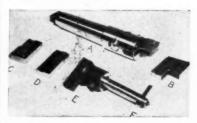
Catalog information is available on request from Logan Engineering Co., Dept. BB, 4901 W. Lawrence Ave., Chicago 30, Ill.

### ADDITION TO PRODUCTS

Behr Products Company, announces that they have designed and added to their lines the following new products.

their lines the following new products.

A—The modern and sturdy Behr Boring
Bar, Taper Shank Model, with the New
Boring Blade inserted.



B—The Standard Facing or Shoulder Boring Blade; always cuts flat and square with the Spindle Axis, increasing efficiency greatly over the method shown at "F".

C-New Back Facing or Inverted Boring Blade.

D-New single End Cutting Fly Tool Blade.

E-The new Small Hole Adaptor for holes smaller than 2" diameter.

Boring range: All models 1500 (2" head dia.) up to 6" diameter. All models 1501 (3½" head dia.) up to 12" diameter.

Write for Catalog 101A for Taper Shank Models, or Catalog 102A for the complete line, to Behr Products Co., Dept 17, 13732 Woodward Ave., Detroit 3, Mich.

### Save hands with Strand's SWEEP SAFGUARDS

With the Strand Sweep double cam action, you obtain proper sweep movement that prevents accidents. Operation of Safguard from press head provides additional safety in case of screw or other breakage.

Send for Circulars on Strand Sweep and Enclosure Safguards

### STRAND MFG. CO.

Safety Engineers

607 W. Lake St. Chicago 6, III.

CAM

DOUBLE

SAFGUARD operates from head of press

### LEADERS FOR HALF A CENTURY

### TOOL CRIBS and PARTITIONS



Standard Sections Woven Wire Mesh Panels and Doors to enclose Tool Cribs, Stock rooms and other enclosures.

IMMEDIATE DELIVERY

Write for Catalog



WIRE & IRON WORKS

3519 E. CANFIELD

- DETROIT 7, MICH.

### NEW AIR-GAGING MEMBER

Moore Products Co., H & Lycoming St., Philadelphia 24, Penn., announces a new type of air-gaging member for use with the Moore Pneumatic Comparator Gage. This new V-block-type pneumatic unit may be supplied for simultaneous measurement of one, two, or more outside diameters as small as 0.150" or as large as 8". The instrument which is illustrated measures two diameters on the



pinion shaft. Rotating the part in the gage checks out-of-round, and sliding the part axially checks taper. The maximum

and minimum masters, by which the gage is set, are shown in the foreground of the picture.

The weight of the part is carried on Tungsten Carbide wear strips, to minimize wear on the V-block type unit. The nozzles which perform the measuring are recessed below the surface. Dirt, oil, and coolant on the work have no affect on the accuracy of measurement say its manufacturers. This gage can, therefore, be installed right at the grinding machine.

The gage is equipped with the Moore Adjustable Compensator. This permits positioning the magnification on standard calibrated dials with interchangeable gaging members of various types and sizes.

Send inquiries to Dept. BB of the Moore Products Company.

### GLOVES FOR INDUSTRY

This men's knit wrist style glove has palm and fingers coated with Neoprene to provide extra long wear and resist water, oil and other liquids. The back is uncoated tan canton flannel to permit free ventilation and make the glove more



comfortable and flexible to work in.

The manufacturer reports that these gloves are now available for factory, farm and home use and are fine for handling wet or moist objects as well as abrasive



materials such as stone, lime and cement.

Manufacturer: Edmont Manufacturing
Company, 525 Orange Street, Coshocton,
Ohio.

### ALL-METAL AUXILIARY DRILL PRESS TABLE

A new all-metal Auxiliary Drill Press Table, 13" x 18" for attachment to any standard type drill press table offers a greatly enlarged and true working surface for numerous drill press operations in wood, plastics or metal. It is now being manufactured by the Barron Tool Company, Inc., Dept. BB, 415 Brainard, Detroit 1, Michigan.

Designed for use with the Barron Planer, Sander, and many other cutting, drilling, grinding and shaping tools, it is cast from hard Alcoa Aluminum Alloy and is Blanchard ground top and bottom to extreme surface accuracy. The unusually large working surface of 234 square inches is said to be smooth and flawless to permit the easy passage of the work piece.



It comes equipped with irregular shaping pin, anchor bolts, fence, fence clampassembly. It is also used as a light accurate surface plate.

# Inderson

### CARBOLOY TIPPED SCRAPER BLADES

Speed up scraping operations with these efficient blades. They are especially good for hard alloy iron and the extremely

hard bronze castings. If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade. They are available in three widths.

Write For Bulletin No. 12-5
ANDERSON BROS. MFG. CO., ROCKFORD, ILL.







### FOR LOW COSTS

- **■** Make Sure You Get the **EXTRA SERVICE**
- of Capewell Hack Saw Blades
- Sawing costs are lower when your machines operate steadily. When the teeth hold their cutting edges longer, blades require changing less
- frequently.

  Capewell hack saw blades are precision cutting tools, and
- their Extra Service is built in by the careful craftsmanship of precision manufacturing.
- Ask your Industrial Supply Distributor for further details.

### THE CAPEWELL MANUFACTURING CO. HARTFORD 2, CONN.

Manufacturers of:

Hack Saw Blades Band Saw Blades Ground Flat Stock Drop Forgings

### NON-CONTACT TESTER

A new gaging instrument known as the Measuray is now being offered to industry by the Sheffield Corporation. It utilizes an entirely new X-ray and electronic application for non-contact, continuous or spot checking of thickness of all types of moving materials.

The Measuray can be applied to almost



any production process where it is desired to measure and regulate the thickness of material. It is suitable for use with brass, copper, steel, aluminum or any other metal; paper, plastics, composition material, film, rubber, cellophane in the form of sheets, or foil of any kind. It is claimed that metal foil can be checked for thickness to an accuracy of one percent just as easily as sheet materials 3/16" thick. Concentricity can likewise be checked to measure a wire surrounded by insulation.

Tolerance and thickness limitations are dependent to some extent on the density of the material to be checked. Speed of movement of material, whether at the rate of 5 feet or 5,000 feet per minute, are said to have no effect on the accuracy of the Measuray. Neither does the temperature of the room, nor of the stock.

The Measuray is a comparator. It compares the thickness of material with a sample of the same material which has the required known dimension. The variations of thickness are indicated in percentages. Standard units are equipped with indicating mechanisms, while re-

cording and machine control devices are available.

Four standard Measuray units are available. Thickness, density and type of material, as well as tolerances to be checked, determine which of the four units is to be applied.

To learn more about this unique tester write to the Sheffield Corp., Dept. BB, Dayton, Ohio.

### GREATER CONVENIENCE, SAFETY IN NEW PRESS

A new, streamlined version of the Walsh Number 3 Horn Press is announced by the Walsh Press and Die Division of the American Machine and Gage Co.

Important safety factors have been introduced by the more efficient motor mounting on top of the press. This eliminates the jutting platform at rear and keeps motor well above workers. Permits press to be placed closer to wall or other machines, effecting a saving in floor space. Additional safety is provided by the shield which completely protects employees from motor, V-pulley, drive belt and flywheel.

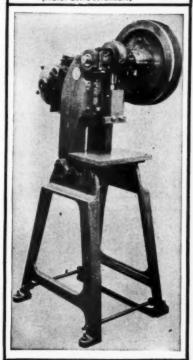


Complete information about this new Number 3H Horn Press can be obtained by writing the Walsh Press and Die Co., Dept. BB, 4743 W. Kinzie St., Chicago, Ill.

### 15 TON HUB PRESS

Immediate Delivery \$450 F.O.B. Hartford Less Motor

(Motor Drive Available)



Other HUB Presses now available, write us —

HUB POWER PRESS
W. F. BREWER MACHINE CO.
75 Laurel St., Hartford 6, Conn.

### AUTOMATIC DRILLING

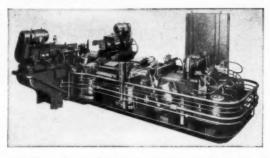
Snyder Tool & Engineering Company, Dept. BB, 3400 E. Lafayette, Detroit 7, Michigan are designers and builders of this machine for drilling a series of holes for mounting bodies, motors and spring suspensions in automobile frames.

This machine accommodates three different size frames, adjustment to longer or shorter frames being made by moving the entire clamp-ing bracket as well as the spindles and

positioning in correct location for the in-

dividual frame.

The series of vertical and angular spindles are driven from individual motors and are fed thru the work by one hydraulic cylinder which actuates action pinions. This cylinder and feed



mechanism is mounted on the inside of the welded steel base.

The design of the machine provides piping for coolant, air and electric wiring on the outside of the machine for easy accessibility and to serve as a guard rail for the operators.

TWO NEW AIR DRILLS
The Rotor Tool Company, Dept. BB,
Cleveland, Ohio announces two com-

pletely new intermediate sizes of Air Drills, of interest to metal working plants, assembly departments, etc.

ing; %", ½" nut setting; %" lag screw or

and 1200 rpm. Weight 9 lbs.

machine screw. Speed 625, 750, 1000

### You need only one DORMAN TAP

, instead of three ordinar tappers . . . to tap No. 2-56 to 3/8" in steel or any other metal.

> Here are three more advantages:

1. No collets to get lost or need replacement.

. Adjustable friction drive. Adjustable friction drive.
 Can produce No. 3 or No. 4 fit. The No. 2 tapper drives from

 $\frac{3}{4}$ " to  $\frac{3}{4}$ " and No. 3-A drives from  $\frac{1}{2}$ " to  $\frac{1}{4}$ " in any tapable material.

Write for further details.

DO BETTER TAPPING AND SAVE MONEY.

Price \$40.00 with M. T. Shank or \$45.00 with Adaptor for Male Spindle Drill Press.



E-22, M830, M854. Capacity 9/16" drill-

E-42, M-840 and M-841. Furnished in both non-reversible and reversible types. Weight 13½ lbs. For drilling 9/16" and %"; reaming %" and 5%"; tapping %" and 5%"; tapping %" and 5%"; nut setting %" and ½" hexagon head nuts.

The E-22, shown here, is provided with spade handle, with auxiliary side handle for firm control. It may be equipped with Chuck or No. 1 or No. 2 Morse Taper.

The E-42 is furnished in side handle

355 CANAL ST. . NEW YORK 13, N. Y.

style—that is, a live and a dead handle with feed screw, breast plate or suspension ring. It is regularly furnished with No. 2 Morse Taper Feed Screw.

Both use the same motor, the "external blade type" developed by The Rotor Tool Company, and many parts such as Rotors, Spindles, Top Plates, etc. are interchangeable. Manufacturer claims that both these tools have rather exceptional power for their rated capacity and that the external blade type motor reduces maintenance problems to a minimum. Actually ready for delivery, in stock.

### ADDITION OF HAMMER MILL

The addition of a new, heavy-duty model Buffalo Hammer Mill to the wellgraduated line of 16 standard types has been announced by the Buffalo Hammer Mill Corp.

This new model Hammer Mill has an overall height of 47", base 53" x 38", charge opening 24" x 30" and is typical of the other Buffalo Hammer Mills which are used for grinding, pulverizing, crushing, shredding, defiberizing and hashing various materials. Buffalo Hammer Mills break up all sizes of material by shatter-

ing blows of several batteries of revolving hardened steel hammers at 1000 to 7500 rpm. Material is hit while suspended in mid air to eliminate the generating of heat from the friction of rubbing and crushing actions. With the elimination of heat, less power is required and both wear and breakdowns are reduced to a minimum.



For complete information on this new, heavy-duty model W-30 (H), write Buffalo Hammer Mill Corp., Dept. BB, 27 Washington St., Buffalo 3, N. Y.



### SEE BETTER - WORK BETTER



### ZEISS INC. HEADBAND MAGNIFIER 21/4x

Use of both eyes reveals true depth of details, Magnification of 21/4x. Free working distance,

about 8", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using, Highest optical quality. Eyeshade of Tenite—practically unbreakable.

Also Aplanatic Folding Pocket Magnifiers 6 and 9 power



Write for Leaflet

CARL ZEISS, INC.
Dept. H-55-11 485 5th Ave., New York 17, N. Y.

#### COLLET CHUCK

A new type of collet chuck for use on all hand screw machines and engine lathes up to 1" capacity is announced by Modern Collet & Machine Co. Known as the Almco Jet-Type Collet Chuck, this unit embodies a new operating principle and is claimed to offer the following advantages:

Gripping pressure of the collet is adjustable in 12 positive steps from zero to 15,000 lbs. Thus thin-walled tubing can be held without distortion, and bar stock is held without slippage for hogging cuts up to the full horsepower of the machine.

The collet is closed by spring action with positive, uniform force, and is opened by a compressed air jet—100 p.s.l. line pressure. This eliminates danger of the chuck opening in case of failing air pressure. There is no contact between the air nozzle and the chuck—hence no wear; and the chuck can be opened in any position if stationary, or at any speed up to the maximum speed of the fastest machines.

Collets are quickly changed from the front of the chuck, and are available in all sizes to 1" maximum, round, hex and square. Used on lathes and hand screw machines, the over-all length of the chuck,

including collet, is 2¾", and the weight is 11½ lb. Chucks of larger sizes are in process of development, as well as indexing bases to enable the chucks to be used for second-operation work on other machines such as milling machines and drill presses.



Full details are given in an illustrated bulletin available on request from Modern Collet & Machine Co., Dept. BB, 401 Salliotte St., Ecorse 18, Mich.

### METAL CLEANING & RUST-PROOFING TANK

The D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Ill., announces a new automatic motorized washing and dipping tank known as Cooper's Automatic Motorized Tank. It is especially designed for automatic washing and cleaning of metal parts, giving continuous agitation. All parts can be cleaned automatically, eliminating hand dipping. Tank can be supplied for a—cold dipping, b—hot cleaning or dipping, heated by 1—electricity, 2—gas, 3—steam.

Inside the tank is a special heavy steel rack. The top of the rack frame is equipped with gears, arms, fittings, geared motor and cut-off switch, so constructed as to permit the inside rack to raise and lower continuously until stopped by button.

Another feature is that by the simple insertion of a bolt, the rack can be ad-

justed to stop after each dipping operation, which is especially effective for wax dipping and rust proofing operations. Cooper's Automatic Motorized Tank is



available for immediate delivery in sizes ranging from 60 to 300 gallon capacity.

#### PRECISION CASTING

Two catalogues—"Fundamentals of Precision Casting" and "Precision Casting Equipment and Materials" have just been released by the Kerr Mfg. Co., 6081 12th St., Detroit 8, Mich. The purpose of these publications is to encourage designers and engineers to explore and plan for the



great possibilities of industrial precision casting in future manufacturing procedures. Write to Dept. BB.

### SOMETHING NEW IN 3-WAY PARALLEL SET-UP BLOCKS

One Handy Set Speeds Set-ups To 12 Different Heights



and 7/8"x 1-1/4"x 1-1/2"

This handy, compact set of Moore 3-Way Parallel Set-up Blocks takes the place of a large number of conventional parallels. Each block may be used in any of its three dimensions to build up to 12 different heights.

Spaced around the work-piece to provide support, parallel or perpendicular to working surfaces, they eliminate sagging, localize stresses and hold work rigidly throughout the machining operation. And they may be placed to avoid interference with holes being bored or ground.

Moore 3-Way Parallel Set-up Blocks are carburized chrome-nickel steel, finish-ground to +.0002"-.0000". Sides are parallel within .0001", perpendicular within .0002". Write for descriptive literature.

MOORE SPECIAL TOOL CO., INC. 728 Union Ave. • Bridgeport 7, Conn.

MANUFACTURERS OF MOORE JIG BORER AND MOORE JIG GRINDER



# For SLOW Speed DRIVES

JANETTE is one of the few Speed Reducer Manufacturers who build their own Gears, Gear Boxes and Motors especially designed for use with Speed Reducers.

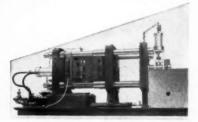
During the 37 Years that Janette Geared Electrical Machinery has been manufactured, skimping has neverbeen permitted in any of their products. This policy has resulted in establishing for Janette a world wide reputation as a manufacturer of the highest quality machinery.

Where DEPENDABILITY is a MUST, you can safely specify JANETTE Speed Reducers.

Janette Manufacturing Company 556 W Monroe St. Phicago 6. 11

### DIE CASTING MACHINE

As the result of continuous research and engineering, reports the manufacturer, the "Cast-Master" is geared for high-speed production at low operating cost. An operation that merely requires loosening two jam nuts, permits adjustment of the stroke to the space necessary for the ejection. This eliminates unnecessary wide openings.



The Cast-Master is claimed to have extreme flexibility, require less time to adjust, and heavy enough to prevent stretch and give to bar linkage. They announce that they have reduced splash and spitting to a minimum. A roller system on a movable plate is designed to insure longer bar and bearing life and facilitate accurate and rapid set-up by alignment of all moving parts.

The Cast-Master die casting machines are said to embody new, scientific and engineering achievements and used by many manufacturers of automobiles and other makers of precision-built products.

The basic features of the "Cast-Master" die casting machine can be adapted to any die casting requirement. For further information and literature, write The Miller-Taylor Tool Co., Dept. BB, 5005 Euclid Ave., Cleveland 3, Ohio.

### CHANGES IN DUST COLLECTOR

New improvements in the Model 1150 Dustkop dust collector, which are designed to increase its efficiency under the extremely heavy dust loads peculiar to production buffing and polishing work, are announced by Aget-Detroit Co., First National Bldg., Ann Arbor, Mich.

The still retaining the combination of cyclone separator and spun glass filter as first and second stage air cleaners, three changes have been made: a high compression filter, a new type filter seal

and cyclone stack deflector have been added.

The high compression filter has the effect of stopping all the particles of lint and polishing dust at its surface rather than permitting partial entry into the filter as in the case of dry grinding dusts which could be shaken out by the hand crank.



The result is that the light lint and dust, which is not taken out of the air stream by the cyclone, form a mat on the under side of the filter. This mat is allowed to build up, and in doing so automatically becomes a filter of its own, stopping additional dust and lint. When sufficient thickness of mat has been formed, the suction at the intake hood diminishes. This is evidence that the mat should be removed.

While the light additional pressure created by the use of the higher compression filter is so nominal that it is difficult to measure with standard air measurement instruments, a sponge rubber seal at the filter edge has been added to insure effective seal at all times.

Address inquiries to Dept. BB.

### BENCH MODEL BUTT WELDER

The Universal Welder Corporation is manufacturing a new line of hand and air operated "Midget" Butt Welders. These units parallel their 3 KVA Midget Spot Welder and more recently intro-

# THE New MODEL 1100 HYBCO TAP GRINDER



- Capacities No. 2 Mach.
   Screw to 1½" Hand Taps.
- All Settings Adjustable To Give Any Angle—Relief— Hook.
- Taps Held In Precision Collets Can Be Sharpened After Center Is Destroyed.
- Standard Motor—Any Current Specification.

Representatives In Principal Cities

HENRY P. BOGGIS & CO.

1279 West 3rd Street Cleveland 13, Ohio duced 71/2 KVA Midget Spot Welder.

In the manual type machines these



units are said to afford a rugged butt welder capable of welding intermittently up to 1/2" round steel and larger for infrequent use.

The air operated units are equipped with a foot switch that starts the cycle by clamping the weldment—followed auto-matically by the completion of heating, weld, push up, and release of the welded

Complete information and specifications can be obtained from the Universal Welder Corp., Dept. BB, 772 Carnegie Ave., Cleveland 15, Ohio.

### CENTER DRILLING MACHINE

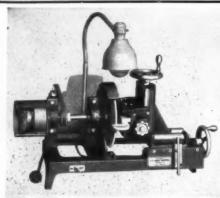
A high production center drilling machine with automatic centering and clamping has been announced and is now being produced by Detroit Tap & Tool Co., Dept. BB, 8432 Butler Ave., Detroit 11, Michigan. In all center drilling operations within the capacity of the machine, output is said to be materially higher per machine hour compared with conventional equipment, without increased worker effort. Quality of work is also claimed to be improved and subsequent

machining reduced in many cases.

Contributing to the high productivity of the machine is the use of only a single lever to control all operations-including automatic positioning, clamping,

feeding the drill.

The machine will handle a wide range



COMPLETE GRINDER as shown in photograph no motor now requires one quarter HP 1750 RPM. A Special Machine for a Special Purpose "Resharpen Dull Pipe Wrenches"

### SPECIAL **Grinding Machine**

Grey Iron Castings. Two tone Enamel finish Grease sealed Ball Bearing Mandrel

Pulley and Belt on mandrel Variable pitch motor pulley Built in & ready wired motor switch

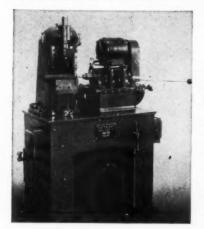
Adjustable Light Adjustable Light
Wire cleaning brush
Face grinding wheel
5 special Grinding Wheels for 6
inch to 48 inch wrench jaws
Special patent wheel mounting
Patent spacing 4, 5, 6, 6½, 7,
8, 9, 10, & 12 per inch

Other accessories Special holder for all Handles (No rivets to knock out)

Mandrel Spanner Wrench 2 "Allen" Wrenches 1/2" square Abrasive Stick Mounted Diamond Wheel Dresser & 3 guides

### J. C. MOORE INDUSTRIES FREDONIA, PENNSYLVANIA

of shapes and sizes. Concentric centers may be drilled in round, square, etc., stock ranging from 1/8 to 2% inches outside diameter. Length of stock is limited only by convenience in handling.



The drill has three speeds, 1250, 2400, or 5200 rpm, obtained through a V-belt step pulley drive from the spindle drive motor. Another motor drives the gear type hy-draulic pump through a flexible connec-tion. The spindle chuck has a center drill capacity of from A-1 to J-2 (1/8 to 1/2" OD.) Drilling depth is quickly adjustable.

### INFORMATION ON METALLIZING

A complete and up to date collection of technical and operating data on the or technical and operating data on the Metallizing Process is contained in the fourth edition of the Metco Metallizing Handbook, published by Metallizing Engineering Co., Inc., Dept. BB, 38 30th St., Long Island City 1, N. Y.

In addition to up to the minute data on preparation of surfaces, metallizing technique and finishing procedure, complete data on corrosion resistance, specific gravity, hardness, bond strength, tensile strength and relative shrink are contained

in many interesting chapters.

rrorusely illustrated with pictures, drawings, diagrams, charts and graphs, this 86-page, pocket size handbook pre-sents both mentical and sents both practical and technical aspects of the Metallizing Process in complete detail. The price of the book is \$2.00.

### MAKE YOUR PRINTS IN A HURRY



Printer-up to 24" x 18" prints



Developer

### with the NEW FOSTER PHOTO PRINTER

FAST. Makes crisp, blue or black line prints from paper or cloth tracings in less than five minutes. Don't hold up production waiting for prints. A battery of Fosters supplements central print departments in big companies. For small concerns, a single Foster is a time- and money-saver.

ECONOMICAL. Costs little to buy - little to operate. Requires no special operator. So simple anyone can turn out clear, sharp prints.

**VERSATILE.** This precision built printer handles sizes up to 24" x 18". Makes prints from tracings, hand written copy, printed sheets.

WRITE FOR ILLUSTRATED FOLDER

### FOSTER SALES CO.

4200 Woodward

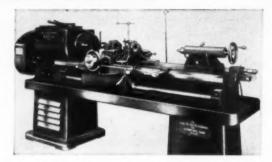
Dept. P Royal Oak, Mich.

#### AUTOMATIC THREADING LATHE

Forty years of experience has gone into the new James Coulter Automatic Threading Lathe. This Type "A" Model "LI" is exceptionally useful for the threading of long traversing, elevating and feed screws.

Each machine is equipped with a disc clutch and the starting and stopping lever is within easy reach of the operator at all times. This is a very versatile machine for the production of square, standard and 29° threads both internal and external.

It has a four speed headstock, accommodates the large range in diameters and the variety of materials to be threaded. The return or the idle travel speed has been increased to five times the cutting



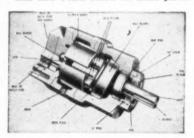
speed, thereby reducing the threading time of the work.

Write for full particulars, James Coulter Machine Company, Dept. BB, Bridgeport, Conn.

### VERSATILE FLUID MOTOR

For those requiring rotary power with controlled variable speed, and particularly where shock-loads present problems for conventional motors, the announcement of a radically new Fluid Motor, by the Denison Engineering Company will be of special interest.

This new Fluid Motor of axial piston



design is available in a 3 hp and 5 hp capacity; with or without a speed control valve; with or without a choice of geared-head units of various gear ratios; and with a selection of brackets for mounting the motor with equal operating efficiency in any position desired.

The motor proper features an exclusive "Floating Drive", wherein constant pressure contact is maintained between the

driving and driven elements without the use of mechanical linkages or connecting rods of any kind. It is said that this eliminates the destructive effects of backlash or inertia resulting from sudden starts, stops and reversals, such as might be found in operation of indexing tables, etc.

For complete specifications on this new Fluid Motor write Dept. BB, the Denison Engineering Company, Columbus 16, Ohio.

#### HIGH SPEED CUTTING MATERIAL

"Vasco Supreme", a new patented cutting material produced by Vanadium-Alloys Steel Co., Latrobe, Pa., is announced as a new type high speed steel. The manufacturers report it has a carbon content higher than any heretofore produced.

The high carbon content of "Vasco Supreme" is said to result in increased wear resistance and contributes to very high hardness from heat treatment..

According to the manufacturers, the carbon-vanadium balance of "Vasco Supreme" produces a very high edge strength and provides ample toughness for all applications, including intermitent cutting. It is said to be capable of operating at speeds 15 to 100% higher than 18-4-1 and 6-6-2 type high speed steels.

Tested for many months on single point

### MILL IT ON YOUR LATHE





NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes, It has gradu-

Sheldon and other makes, it has graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself. IMMEDIATE DELIVERY Price

				the building the b			
	Nos.	Width	Depth	Jaws	Weight	Base	F.O.B.
0	150	Jaws 11/5"	Jaws 1"	Open 15/8"	Founds 61/2	Opening	Factory \$18.75
	250 400	21/2"	11/4"	21/2"	11	11/4"	24.75 39.75
Orde	r from your	dealer or				lo. 350.	99.73

CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of PALMGREN PRODUCTS for over 28 Years 8384 South Chicago Avenue Chicago 17, Illinois





The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from 3/16 to 1". They are made for heavy and light duty types with taper or threaded arbor hole—to fit - to fit all machine tools and portable tools.



Write for complete details.

The Original

No. 250

**Manufacturers** 

of Drill Chucks

T. R. ALMOND CO.

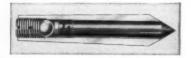
ASHBURNHAM,

MASS., U.S.A.

lathe and screw machine tools, flat and circular form cutters, broaches, drills and solid and inserted blade milling cutters, "Vasco Supreme" performance is claimed to indicate marked savings in machining time, increased life between grinds, and operating improvements on materials normally considered difficult to machine. Write to Dept. BB for more details.

### REVOLVING TIP LATHE CENTER

A new revolving tip "live" lathe center with the same dimensions as standard solid centers has been announced by E. H. Vanderwall Co. It is known as the



"Evco" Revolving Tip. A hardened steel center spindle revolves within the steel taper shank, with exceptionally long bearing surface. The thrust end of the spindle is slotted and spring tempered to

vield slightly under load.

"Evco" Revolving Tip centers are available in three sizes, No. 2 Morse Taper Shank, No. 3 Shank, and No. 4 Shank. Literature and information may be obtained by writing E. H. Vanderwall Co., Dept. BB, 440 Golden Gate Ave., San Francisco, Calif.

### DRILL BUSHING "BLANKS"

The need of the tooling industry for



an economical emergency or special drill bushing is being met with the Conex adjustable center bushing "blank". This mass production is designed to replace that unexpected bushing which must be made up in the tool shop.

made up in the tool shop.

The two piece "blank" is composed of a sleeve and an insert. The sleeve is



slotted to allow for slight expansion or contraction to fit the hole which will be the bushing location. It comes completely finished. The insert is made of a fine grade tool steel and is incomplete. Its length is to size and the indexing slot is completed. Its eccentric drill-center location is started with a drill and counter-

The user can complete the insert to the desired drill size in a small fraction of an hour by using a drill press and blow torch or equivalent for hardening. The blank insert can be tapped instead if desired thus becoming a tapped fastener.

Further data may be had by writing to Conex Products, Dept. BB, Box 629, Glendale, Cal.

### NEW TYPE GANTRY CRANE

Portability, ease in handling and flexibility for many varied lifting services are



the features claimed for this new Gantry Crane. Of 1-ton capacity with generous safety factor and minimum gantry weight, it has a broad variety of uses at loading platforms and docks, in power plants, machine shops, factories and garages and for construction, maintenance and farms.

Fully described in bulletin PG-648. It is made by Industrial Equipment Co., Dept. BB, 315 N. Ada St., Chicago 7, Ill.

### INDUSTRIAL DIAMONDS DIAMOND TOOLS DIAMOND WHEELS DIAMOND POWDER



Our No. 703 — three layers of seven dia-monds each. Multiplicity of cutting points; depending on diameter of wheel, four or depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straightfaced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.

Requires fewer passes across the wheel. Generally used with fast dressing traverse.

"Experts agree they are the best on the market."



### 31 W. 47th St., New York 19 N.Y.

Representatives:

Buffalo—Iroquois Carbide & Abrasive Co.,
91 Grivale & Abrasive Co.,
92 Grivale & Griv

# For Efficient Dust Collection -



Model R-400. Fifteen filter tubes. Fits limited space. Easily installed.  $1\frac{1}{2}$  h.p. motor. 1540 c.f.m. at 5500 l.f.m., static pressure  $3\frac{1}{2}$ ".

# TORNADO

WHEREVER grinding, buffing, polishing or other operations cause fine dusts or lint, use the TORNADO Dust Collector. noted for its efficiency. Large filter surface. Exhausts clean air. Collects finest dusts or large, heavy particles. Improves health. Increases production.

> Write for folder and demonstration

### BREUER ELECTRIC MFG. CO.

5118 N. Rovenswood Ave. CHICAGO 40, ILL.



# FAST, ACCURATE SPACING

Graduated in thousandths, you have plus or minus .0005" at your fingertips

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

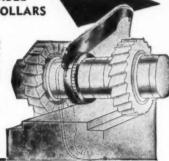
You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

Made in 12 standards for cutter arbors from %" to 2". Write for illustrated Bulletin 120-7.

DAYTON ROGERS MFG. CO. 2849 12TH AVE. SO., MINNEAPOLIS 7, MINN.

for SIDE MILLING CUTTERS

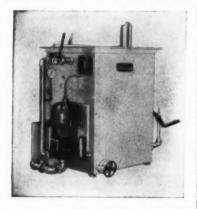
GANG MILLING SET-UPS



### SPRAY TYPE WASHER

A new, spray type washing machine, for the quick and thoro washing of parts on racks, has been announced by the Optimus Equipment Co., 157 Church St., Matawan, N. J., manufacturers of washing and drying equipment.

This new Optimus machine can be placed directly on the floor—no pit or cement work is necessary. The top of the



unit is at working height, and all connections are readily accessible. Lever operated valve makes starting of the spray easy. Spray nozzles are adjustable and replaceable.

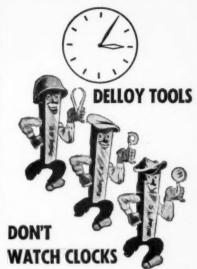
The same machine can be used with submerged agitation to remove caked greases such as Tripoli Compound and

This machine is designed to eliminate slow and laborious hand-cleaning of small metal parts. It can be used individually, or in series where the washing operation requires several steps, for example solvent wash, rinse, alkali wash, second rinse, all of which operations can be performed with this Optimus spray type washing machine.

### BRUNING BW PRINTS

As a result of constant research and continual improvement, the Bruning BW Direct Line Process-as developed by the Charles Bruning Company, Inc., offers a wide variety of prints for general and special needs in business and industry, Bruning officials state.
All these BW Prints are direct line,

positive prints-made directly from trans-



There are only 24 hours in a day. But those 24 hours can be made more productive by calling in the Delloy trio for "allmetal" machining—Delloy GP (General Purpose) . . . Delloy CA (Cast Alloy) . . . and Delloy TC (Tungsten Carbide).

The superior toughness of Delloy enables you to take advantage of increased cutting speeds and the full power available in your machines. The long-lasting edges of Delloy reduce down-time to the minimum. As a result, you produce more pieces per day at less cost per piece.

If you have a problem in turning, bor-ing, planing, or facing, talk it over with the skilled tool designers and metallurgists at Delloy. Also send for new catalog.



Affiliate of Ace Manufacturing Corporation 1209 E. Erie Avenue, Philadelphia 24, Pa. Sales Representatives in all Principal Cities

parent or translucent originals and ready for use in seconds. The BW Printer-Developers on which they are produced require no plumbing and can be installed

anywhere in plant or offices.

To distinguish prints used by different departments, light, medium or cardweight BW Prints may be produced with brown or red lines on a white background. No specially sensitized BW stock is necessary. When still further differentiation is required, BW Prints may be produced on green tinted backgrounds with black, brown, or red lines.

A combination printer and developer is one of the many Bruning machines offering capacities for every need. Address all inquiries to Charles Bruning Co. Inc., Dept. BB, 4754-14 Montrose Ave., Chicago

41, Ill.

DRILL AND REAMER HOLDER

This is the new adjustable Drill and Reamer Holder of the Boyar-Schultz Corp., 2108 Walnut St., Chicago 12, Ill. It is made from drop forged alloy steel

and is said to be designed to withstand impact and strain. The holder has a heavy set screw boss to give it extra strength. The manufacturers report that this holder was designed to take the heavy strain of production runs.

The mating surfaces, bore and shank, are hardened and ground to promote quick, easy adjustments and a saving of

These are available in three sizes No.



00, No. 0 and No. 2. Long or short shank is available in the 00 and 2 sizes. A bushing blank is furnished with each tool.

### SPECIALTY EQUIPMENT & MACHINERY CORP. 230 PARK AVENUE **NEW YORK 17, NEW YORK**

OFFICES IN:

BOSTON, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DETROIT, HOUSTON, PHILADELPHIA, PITTSBURGH, ST. LOUIS, ST. PAUL

### EXCLUSIVE REPRESENTATIVES FOR:

STRUTHERS-WELLS HYDRAULIC TANGENT BENDERS DORR MULTI-PIERCE AND MULTI-BEND MACHINES DORR CLO-CENTER DRILL HEAD AND SPECIAL MACHINES ACRO WELDING EQUIPMENT FOULK RETRACT-A-TOOL

WATCH THIS SPACE FOR FUTURE ADVERTISEMENTS FEATURING SPECIAL MACHINERY.

# SAVES TIME -- MAKES MONEY MARSHALLTOWN THROATLESS SHEARS

CUTS ANY SHAPE
CUTS ANY SIZE
CAPACITY UP TO 1/4" STOCK

Here's the shear that offers best performance features. Cutting speed 6' per minute. High grade tool steel cutters. Write today for details. Prompt shipment.

MARSHALLTOWN MFG. COMPANY 900 Nevada Street Marshalltown, Iowa



MILLING - DRILLING - BORING ATTACHMENT 101 Heavy Duty Operations

Photo shows a special operation not suited to standard straddle mill set up but easily handled by means of a RUSNOK Milling attachment used horizontally on a standard milling machine, saving one machining operation and accomplishing greater accuracy in finished piece parts. Uses many types of cutters on a wide range of work. Easily mounted—tits to any angle. Large size spindle (No. 9 B & Staper). Takes ½" to ½" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM. Lever and worm feeds. ½ h.p. meter. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations.

Prompt delivery.

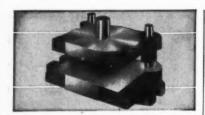
Write for illustrated circular and prices.



RUSNOK TOOL WO

CHICAGO 39, ILL.





PRECISION DIE SETS

STANDARD OR SPECIAL

Their Precision Means Greater **Accuracy in Your Production** 

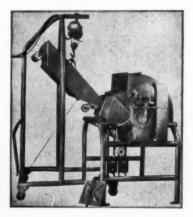
### DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue • Chicago 50, Illinois Milwaukee • Detroit • Cleveland • Dayton Rochester • Philadelphia • Long Island City Ducommun Metals & Supply Co., Los Angeles

### COMPACT DEBURRING UNIT

The deburring problem is solved, say Almco, Inc., of Minnesota. They are pro-ducing a deburring and finishing installation which is one complete unit. They report that mass production deburring is now possible regardless of the nature of the metal, from the softest aluminum to the hardest steel.

The principle by which this system works consists of the use of Honite, in conjunction with the proper machinery. Honite is an abrasive developed during the war. To meet the need for this auxiliary equipment the Almco Welded



Steel Octagon Barrel was developed. These are built in many standard sizes, with from one to five compartments. These range in size from 12" x 30" to 60" x 30", or may be built to specifications. The inside may be lined with neoprene.

Many items with such parts as slots, threads or holes are reported to be deburred to close tolerances, even tho they had previously been precision machined. Tolerances higher than that normally required by industry is claimed. By a variation of the Honiting process the cutting action may be increased for use on rough castings.

Barrels are powered by 2, 3, or 5 hp motors. An electrically operated screen separates work load as it comes from the barrel. These range in size from 1/16" to 2" mesh.

Used in conjunction with the unit



# TEMCO MODEL



### ELECTRIC FURNACE

The new MODEL C E A has been designed to give superior performance, with ease and economy of operation, at a low initial cost. It will stand hard use and is an ideal furnace for general laboratory purposes, heat-treating and small unit production.

SPECIFICATIONS

tribution of heat.

Temperature Control — Any temperature from 500° F. to 2000° F. can be selected and automatically maintained with the TEMCO variable temperature control.

Pyrometer — Indicating type calibrated in both Fahrenheit and Centigrade scales.

Dimensions—Inside 4¼" wide, 4¼" high, 6" deep. Outside 12" wide, 15½" high, 14½" deep.

Prices Model CEA Complete For 115Y.—A.C. only....\$80.00 For 115Y.—A.C. & D.C. 85.00 For 230Y.—A.C. only... 85.00

· Heating element, special high tempera-

Insulated with highly efficient, light-

ture alloy, completely surrounds heating chamber assuring the most uniform dis-

weight materials cast permanently into

- Heats up to 1500° P. in 30 minutes.
   Can be operated continuously up to
- Can be operated continuously up to 2000° F.
- Embedded heating element protected against damage and chemical deterioration. Muffle core easily replacable,

n. Muffle core easily replacable, furnace body.

See your supply house or write for literature. Other sizes available.

THERMO ELECTRIC MFG. CO., 486 W. Locust St., Dubuque, Id.



SPIRAL MANUFACTURING CORP.
3612 NO. KILBOURN AVE. CHICAGO 41, ILLINOIS

shown here is an Almco Self Dumping Electric Hoist. This is designed for use in moving heavy equipment for machine repairs, mounting heavy lathe chucks, changing heavy dies, loading and stacking in the warehouse, and any other place where heavy lifting is required. Height from floor to hook is 8° 4". Special heights may be made to order. Hoist is controlled by switch attached to the frame.

For illustrative material and specifications write Almco Inc., Box 889, 322 Hyde

Bidg., Albert Lea, Minn.

### ROTARY SHACKLE LOCK

When an exposed lock is used on such things as tool boxes, lockers, or gates, it is necessary to have one that will not rust, chip, scale or blister. Added to this is the need for a lock that is as thief-proof

as possible.

The Sterling Lock Co., announces that they have the answer to this problem. It is the Sterling Rotary Shackle Lock. It is designed so that the strain or stress will be taken up by the body of the lock rather than by the locking piece. A chain may also be provided with the lock if it is to be used where it may be misplaced.

The manufacturers guarantee these

locks to give satisfactory service. For more details write Dept. BB, Sterling Lock Co., 1301 S. 3rd St., Minneapolis 4, Minn.

### HIGH SPEED MILLER

A drum-type milling machine permitting single or double milling of four pieces simultaneously has been developed by the Sommer and Adams Co., 18517 Euclid Ave., Cleveland 12, Ohio, to speed production of studs, nuts, bolts, pins, strips, etc. It is designated in their line as "No. 3 Craftsman" for straddle milling, slotting or facing. Among other speed-up features are the quick-loading chuck, automatic ejection of finished work and easy access to cutters for adjustment or regrinding.

to cutters for adjustment or regrinding. The drum rotating gearbox is mounted in the center of the frame and consists of a worm and a worm wheel driven by a hardened and ground worm and tractor bronze worm gear, with pick-off gears for changing the speed of the rotation of

the drum.

The spindle drive V-belt pulley has a disc type clutch for disengaging rotation of the cutter spindles and drum. The cutter spindle overhead arms are of the swing type to allow easy removal of the cutters.

# CUT ANY SHAPE BETTER with BEVERLY Throatless SHEARS



The No. B-3 BEVERLY Bench Type Shear with Ball Bearing Hold Down handles 3/16" or No. 10 gauge stainless steel. This sturdy shear weighs 58 lbs. and is equipped with H. C. H. C. Blades for heavy duty service.

Let us send Bulletins giving full details on the BEVERLY LINE -

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, III.

### AID TO TAPPING

Here is a unit designed to get a precision job done with a minimum of tap breakage. The makers state that even an inexperienced operator can tap holes with its use.

It is called the Manco Tapmaster, manufactured by the Manco Engineering Co.



When using the Tapmaster the tap remains motionless until pressure is exerted against the leadscrew. The tap then rotates in the proper direction to tap the hole.

The Tapmaster lead screw assembly is designed to be used in conjunction with 14" and 15" drill presses for precision tapping. Since the tap is driven by a leadscrew of the same pitch the operator can depend on a correct lead in his thread.

The leadscrews are %" dia., 20-24-28-32 and 40 pitch threads. Special pitch leadscrews and nuts may be furnished upon request.

The exclusive national sales representatives of this company is the Read Machine & Tool Co., 4714 Huntington Dr. So., Los Angeles 32, Cal. The Read Company is also seeking local distributors for this product. Write to Dept. BB.

### PRESS WITH NO MOTOR OR PUMP

A complete new line of high-production, fully power-operated, hydraulic presses that have neither motor nor pump



SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only \$145 One-inch capacity, \$95 Round, square or hex collets, plain-serrated

HALL MANUFACTURING COMPANY 622 Tularosa Drive • Los Angeles 26, Calif.

# "OLIVER"

# **Band Saw Brazer**

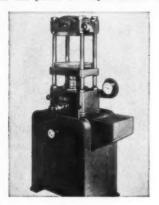
Brazes a Joint as good as the saw itself



Brazes metal-cutting as well as wood-cutting band saw blades in one simple operation requiring only a few seconds. A mere turn of the switch makes heat available. Control of heat assures proper temper of blade. Also investigate the "Oliver" Vise to hold blade for beveling ends, filing side, and dressing the teeth.

Ask for all the facts

OLIVER MACHINERY COMPANY GRAND RAPIDS 2, MICHIGAN has been announced by Elmes Engineering Works. Compressed air from shop line, introduced above the liquid, provides the power for rapid closure and



instantaneous full pressure.

The manufacturers report that this new hydraulic principle was designed to provide greater economies in molding, assembly forcing, straightening and testing. Made in 20- and 30-ton bench-type and floor-type models, and in 50-ton floor-type. 30-ton floor-type, shown, has 6" stroke with opening adjustable from 0" to 13"; can be equipped with 10" x 10" hot plates. Height: 65". Shipping weight: 1325 lbs. Floor space: 37" x 19". For more information on these new pumpless, motorless presses, write Elmes Engineering. Works of American Steel Foundries, 244 N. Morgan St., Chicago 7, Ill.

### STEPLESS SPEED CHANGES

A new development of planetary motion in which two standard cross-section V-belts and four variable pitch pulleys provide infinite ratio, stepless speed from full down thru zero and into full reverse at constant torque of two-horsepower capacity is jointly announced by Speed Selector, Inc., Cleveland, and The B. F. Goodrich Company, Dept. BB, Akron, Ohio.

The Cleveland company designed and developed the new V-belt control, known as the Variable-V-Planetary Speed Selector, while B. F. Goodrich will merchandise the product along with its transmission lines.

### No. 2 To No. 6

Screws Driven on this Husky but Sensitive Hopper Feed Screwdriver.

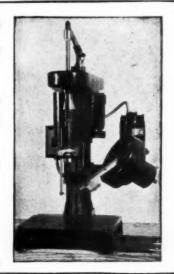
No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.

# DETROIT POWER SCREWDRIVER CO.

2809 West Fort St.,

Detroit 16. Mich.



Speeds from 400 rpm to zero, forward and reverse can be obtained. All changes are made by a hand control wheel, which alters the pitch diameter of the center pulleys so that as one is increased the other is decreased and the change imparted to the outer pulleys by the wedg-



ing action of the V-belts. The wheel thus controls diameter of all four pulleys without use of springs or complex link-

Prelubricated, plastic seal, ball type bearings eliminate dirt and lubrication problems. Shafts and other wearing parts are hardened and ground to insure precision fits and long life. Natural ventilation is created by the revolving assembly inside the aluminum housing.

Among machine applications suggested are agitators, conveyors, drill presses, folding machines, grinders, hoists, lathes, milling machines, pumps, scale hoppers, and shapers.

### NEW STYLE CAM SHAFT BUSHING ASSEMBLING PRESS

Five different sizes of cam shaft bush-ings are assembled in eight cylinder motor blocks in one operation on this new style Oilgear 15-ton Cam Shaft Bushing Assembling Press.

Conveyor height design - semi - automatic, interlocked, electric-hydraulic control-alternative manual pushbutton con-

Fast Accurate Measurements VERNIER Quick Action CALIPER Stainless Steel THE PERFECT TOOL for machine shop, tool room, inspection and quality control, etc.

- · External, internal and depth measurements all read simultaneously with a flick of the thumb on one vernier scale.

  "Open Window" type sliding jaw ex-
- poses scale completely and allows a
- free reading.

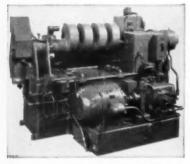
  Knife edged hardened jaws accommodate thread measurements.
- · Accurate measurements to .001". Packed in a sturdy leatherette case.
- Painstakingly machined, American made. Cataloa Scale Vernier Number Size Graduations Reading 21 1/40" .001 1/40" 22 .001 & full mm. & 1/10 mm.

Also AMIC Precision Vernier Calipers, Height Gages, Depth Gages, Pocket Calipers, Pre-cision Graduated Metal Scales.

Write for FREE Booklet C and price list or telephone PEnnsylvania 6-0687 Some exclusive territories available for manufacturers' agents and jobbers, \*Registered Trade Mark

AMERICAN MEASURING INSTRUMENTS CORP. 240 WEST 40th STREET NEW YORK 18, N.Y.

trol—variable pressing and return speeds—and reduction of operator's work to slipping cam shaft bushings on pins and guiding block to assembly position, are the salient features of this new style press, Manual turning or lowering and raising of horn type assembling bar and operation of cycle control levers are eliminated.



Semi-automatic operation is selected by pressing a single pushbutton. Automatic-

ally, without depressing any buttons or further attention from operator, a small hydraulic actuated plug enters end cam bushing hole to locate block angularly; the hydraulic actuated rack and pinion turns bushing bar to lower the bushings in line with cam shaft bearing holes and large guide pins in line with front and rear main bearing holes. The main ram pulls bushing bar to accurately position motor block on pins entering the main bearing holes as the five cam shaft bushings are pressed home. The main ram pushes bushing arm back, the hydraulic actuated rack and pinion turns bushing bar to raise bushing horns and the automatic cycle is completed.

Manual pushbutton operation is selected by pressing a single button. Pressing an emergency mushroom button stops cycle at any point. Pressing reset button returns bushing arm to loading position.

A direct reading gauge indicates the pressure and force required to assemble bushings. Electric switches and solenoid operated valves direct the sequence of operation.

For more information write the Oilgear Co., 1403 a W. Bruce St., Milwaukee 4, Wis.

# PATENTED ROTARY VACUUM PUMPS

PRESSURE BLOWERS, GAS BOOSTERS AND COMPRESSED AIR MOTORS

VACUUM TO WELL OVER 29 INCHES MERCURY PRESSURE TO 25 LBS.

THEY TAKE UP THEIR OWN WEAR

Complete Motor Driven Units or Bare Pumps



QUIET POWERFUL EFFICIENT

> FREE TRIAL

GET ONE FOR FREE TRIAL SUBMIT YOUR PROBLEM TO US

LEIMAN BROS., Inc. 173 CHRISTIE STREET

### **BRAND NEW** PRECISION

# ROTARY TABLES



9"—\$ 97.00 12"— 160.00

15"- 185.00 18"- 220.00

18"- 350.00 Extra Heavy

Duty 21"- 500.00 Extra Heavy Duty

25"- 590.00 Extra Heavy Duty

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

WE CAN ALSO FURNISH DIVIDING ATTACHMENTS. SEND FOR LITERATURE AND DETAILS.

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### LAFAYETTE TOOL & SUPPLY CO.

128 LAFAYETTE STREET

NEW YORK 13, N. Y.

### PROMPT DELIVERY ON THIS EFFICIENT SQUARING SHEAR

A newly designed Foot Power Squar-ing Shear embodying many new im-provements not found on similar ma-chines. Built in one size, 36° to shear 16 gauge soft steel and lighter. All steel welded



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# TO PREVENT-

# LOSS OF TIME AND LABOR



drive your productive machinery by the powerful, persistent torque developed by MULE-PULL CLUTCHES... it saves time and boosts production by the smooth and instant acceleration it gives. The Loose Sleeves of these Clutches have RING-OILING lubrication which prevents groundout bearings and avoids costly repairs. The single-arm, anti-friction ROLLER TOGGLES which actuate these Clutches give high horse-power capacity; require no lubrication and are free from repairs even under constant in-and-out engagement.

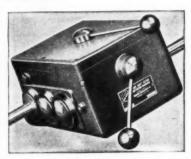
### SEND FOR BULLETIN No. 25-B DESCRIBING



### A NEW UNI-DRIVE

A New Turner Nine-Speed Uni-Drive Unit has been announced by the Turner Machinery Co., Dept. R., Kansas City, Mo.

This Unit has been designed for use on power units with horsepower ratings of from one to twenty. It can be used on such machines as shapers, hand screw machines, milling machines, lathes, and many others.



The Turner Company reports that this has been thoroly tested and worked on for years, and that the best of workmanship and materials were used. This ninespeed selection sliding gear transmission is claimed to have better than twice the versetility of its predecessor.

is claimed to have better than twice the versatility of its predecessor.

One of the features which makes this unit handy is its compactness, eliminating any overhead line and counter shafts. Further information may be obtained di-

rectly from the manufacturer.

### NEW DRIVE-ALL SALES POLICY

A new sales policy has been announced by the Drive-All Company, 3400 Conner Ave., Detroit, Mich. The purpose is to give more emphasis to the sale of their products thru authorized dealers and special representatives.

This company maintains several factory branch offices across the country. Field engineers are stationed at these offices to provide technical aid for their

dealers

Drive-All is known in the industry for its industrial transmission systems which are used on machines engaged in both the manufacturing and processing industries.

A. N. Haskell, director of sales has been with the company for thirty years while assistant director is C. R. Sponhauer, who has been with them for eleven years.

Dealers interested in handling the Drive-All line of products should write to the above address.

### "AIRGRIT" MARKING UNIT

This machine, designated as Matthews "Airgrit" Marking Machine, has been developed by Jas. H. Matthews & Co. for marking delicate or precision parts that should not be marred or distorted. This



is done by means of a short blast of fine grit against rubber or celluloid stencil masks, upon which the part to be marked is placed.

The unit is operated by air pressure, and is constructed for very fine work. The regular plant air line is used with a reducing valve and gauge installed between the line and the unit.

The "Airgrit" is also equipped with an electric timing unit, which enables the operator to fix the length of blast, so that parts may be marked uniformly and with greatest legibility.

"Air grit" stencil masks, into which the desired marking is cut, can be furnished in celluloid and patented rubber. It can mark legibly an area 4" x 3", using a \%" I.D. nozzle.

Literature is available from Jas. H. Matthews & Co., Dept. BB, 3946 Forbes St., Pittsburgh, Pa.

### Rogers Stand For 61 - 80 Drills

(Pat. Pending)



Keeps drills available and in order

Base clearly marked with permanently embossed numbers and decimal equivalents. Wide spacing and complete exposure make selection and replacement easy. No loose parts.

Snap-on cover retains drills, prevents damage and protects from dust.
Only two plastic parts, strong, non-corrodible, light weight.

List \$1.00 — Less Drills

See your dealer Dealers inquiries invited

### V. F. ROGERS

2454 15th St. Denver 11, Colo.

### MERCURY SWITCH

Here is a mercury switch which is said to remain cool in operation at 100 amps continuous current. It is an all metal, Type D-100 Switch and provides a fused hermetic seal between metal and ceramic.

Due to its metal construction this mercury switch is applicable to such things as tank rheostats of plating equipment, where other switches are exposed to cor-



rosive and burn. Remote control and Automatic equipment provide a wide field of application.

The specifications of this switch are: length—4"; diameter—1¼"; current rating—100 amps. at 110 volts or 220 volts, d-c or a-c. It is claimed that at full load rating of 100 amps. the temperature rise is only 25°C above ambient, under normal operating conditions.

Information may be obtained from its manufacturers, Mercontrol, Inc., Dept. R, 278, Pearl St., N. Y. 7, N. Y.





### Immediate Delivery!

Standard Size Dowel Pins from 1/8" to 1" diameter and from 3/8" to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

### SCHULTZ & ANDERSON CO.

109 Edison Place, Newark 5, N. J.

### PORTABLE ELECTRIC GRINDER

The New Precise-40 electric handtool and portable grinder has 1/5 hp and speeds to 40,000 rpm, for grinding, milling, drilling, finishing and polishing of metals, plastics, glass, and special operations such as milling hardened steel and stainless steel welds with carbide cutters. Tool weight is 40 ounces.

Features of the new tool include a larger, more rigid precision quill fitted with a No. 0 Morse Taper for interchangeable mounting of precision collet chucks for rotary cutters and millers, a Jacob's chuck for small or special arbors for

unmounted grinding wheels and diameter drills, abrasives of various kinds. Special spindles can also be mounted to extend the quill length for internal grinding and engraving.



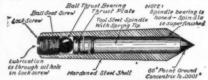
This may be used as a handtool or mounted on a stand, vise, lathe, or milling machine. For further information write to Precise Products Co., 1331 Clark St., Racine, Wis.

### DRAWING COMPOUND

A new drawing compound has been perfected in the laboratories of The Texas Company. Called Texaco Drawing Compound No. 2, the new product is adapted particularly for use in stamping and drawing operations. This product, which has a paste-like consistency, is easily washed from a completed piece with

For further information write the Texas Co., Dept. BB, 135 E. 42nd St., New York City.

#### LATHE CENTER REVOLVING



ERNEST H. VANDERWALL CO.

440 Golden Gate Ave. San Francisco 2, California

- Runs cool and yields under load to compen-sate for work expansion
- Same dimensions standard solid centers
- No more messy lubri-cation of work centers
- No more damaged conter holes in work
- struction throughout Saves time-saves moncy-saves work

No. 3-\$7.75

No. 4-\$9.75 Merse Taper ASK YOUR

\$6.25

No. 2 Morse Taper Shank

DEALER FOR DETAILS



WITHA

Funch,

Allied's R-B Interchangeable Punches and Dies for the metalworking and

plastics industries are available from stock in standard round, oblong and square shapes of almost any required size. Special shapes such as those illustrated are promptly furnished to your specifications in any size or material. Full information and comprehensive R-B Catalog on request.



### ALLIED PRODUCTS CORPORATION

Department 21, 4644 Lawton Ave.

Detroit 8, Michigan

NOW YOU CAN SEPARATE AND ASSEMBLE DIE SETS.. QUICKLY.. EASILY.. SAFELY!

# with a PERSSON DIE JACK

These Die Jacks eliminate old-fashioned, unsafe, prying or hammering methods. Just clamp on punch holder and turn handle. Punch holder is raised for lowered smoothly, always under control. PERSSON Die Jacks are precision built from fine steel and alloys—a tool every tool maker will want for his tool box or bench drawer.

**NO PRYING . NO HAMMERING** 



PERSSON MFG. COMPANY, 2 HENRY ST. BLOOMFIELD 2, N. J.



### **EXHAUST VALVE**

Mead Specialties Company, specialists in air power devices, announce a new kind of quick exhaust valve for use with pneumatic cylinders. It acts on the principle of a bellows to expel the air more quickly thus speeding production.

This unit automatically opens as the air supply is shut off, thus speeding up the return stroke of the air cylinder. It can be attached directly to air cylinders with a ¼" pipe nipple, or cut into the air hose adjacent to the cylinder.



Overal dimensions, exclusive of nipples, are: Body diameter, 1¾"; height, 1½"; length, 2¾". Both nipple openings tapped ¼" N.P.S.

Complete details may be obtained by writing to Dept. E.V., 6—Mead Specialties Co., 114 N. Knox Ave., Chicago 41, Ill.

### ROUGH BORING TOOL

A new Rough Boring Tool has recently been added to the line of tools manufactured by Madison Manufacturing Co. This new tool is an extension of their line of reaming and finish bor-

ing tools, and offers several exclusive features that make it adaptable to production and jobbing shop operations.

The cutting blades are not inserted into a block. Rather the blades themselves form the cutting block. A few of the chief advantages of the new tool are quick changing of cutters, adjustment of cutter size before mounting in bar and positive centering of cutter in bar. The Madison locating feature automatically centers the cutter, equalizing the load



on the cutting elements.

A single micrometer thread screw expands both blades equally from the centering slot on the blades themselves. The manufacturers report that as much as an inch and a quarter of stock has been removed at a very heavy feed.

Complete information including specifications and prices may be had from Madison Manufacturing Company, Dept. BB, Spring and Bauer Sts., Muskegon, Michigan.



SAVE:
Drilling time
Set-up time
Equipment investment

· Floor space NOTE: Special spindles are available to permit use of drills 4" to 36" diameter with corresponding minidrills 1/4" to 3/8" diameter mum centers of 1/2" and 7/8".

Write for catalog sheets and complete details





For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts ... Shows up in sharp relief-dries instantly-easily removed ... Write for circular.

\*Purple shipped unless otherwise specified

MICHIGAN CHROME CHEMICAL COMPAN'







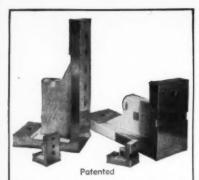


No waiting when you order Greaves Silent Bakelite Gears. . We have them in stock NOW! . Your order will go forward immediately. . You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. . You'll marvel at their great strength to carry big power loads . . . their remarkable ability to

successfully operate completely submerged in water. · You'll welcome their low cost. . No metal reinforcements required. . Save Time . . . Money . . . Labor!

We also make silent gears of rawhide and Fabriol.





World's Best; Surface, Lapping, Angle Plates, Straight Edges, Box and Steel Parallels, semi-steel plate and special products.

# TATRA TOOL CO. P. O. BOX 1352 AKRON, OHIO

### MOTOR DRIVEN PUMPS

This is the new ball bearing motor driven pump being placed on the market by the Ruthman Machinery Company. Called Model 2-C, this pump is said to be capable of handling 70 gallons of liquid



per minute at a total head of 22 feet when equipped with a ¾ hp, 1725 rpm motor.

The pump can be installed either below or above the reservoir, in a horizontal or vertical position. When desired, it can be converted to a pipe inlet type by use of a pipe adapter plate which is available in several sizes. Other similar models will be available from ½ hp to 2 hp inclusive.

This company also manufactures the "Gusher" pumps which have been on the market for some time. To distinguish these two lines the new addition will bear the trademark "Rumac."

Further information may be obtained by writing the Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio.

### WHEELS FOR ABRASIVE BELT POLISHING

No clogging of abrasive belts with increased production and longer belt life are improvements claimed for Presto Contact Wheels, as announced by The



Manderscheid Company, 810 Fulton St.,

Chicago 7, Illinois.

Presto Contact Wheels are made of specially constructed Neoprene Rubber vulcanized to a metal core. Complete freedom from hard spots avoids burning. The patented design snaps the belt as it leaves the work, beating it clean with 72 hammer strokes per revolution of the wheel. The abrasive belt is thereby said to be kept clean and cuts effectively until the abrasive is worn off rather than clogged up.

Presto Contact Wheels, 14" in diameter with 2", 3" and 4" face, are carried in stock. Diameters are uniform and two or more wheels can be used together in forming any desired width.

Three degrees of resiliency, Medium, Hard and Soft, meet most conditions. Medium is suitable for 90% of polishing jobs. Hard is used for snagging and other coarse grained work. Soft handles plastics and extremely soft metals.

and extremely soft metals.

Literature mailed promptly on request to manufacturer.



# UUICK MARKING EOR PART NUMBERS

MARKING BY ROLLING
IS FAST . . . ECONOMICAL . . .

Identification numbers have become an essential factor in production. With this machine you can mark flat surfaces as well as around peripheries on your various components. Trademarks... Names... Instructions, etc., are permanently rolled into your parts. Send prints showing parts, desired marking and its location on the part for quotations.

DESIGNED AND MANUFACTURED BY

GEO. T. SCHMIDT, INC. 1802 W. BELLE PLAINE AVE CHICAGO • 13 • ILLINOIS



when you want Speedwhen you want power-

... in your job of sanding,

filling and rubbing, drilling or screw-driving, you want a Strand Flexible Shaft machine, because a Strand will do it faster, better, and stand up to it longer.

Strand Flexible Shaft machines provide constant speeds with greater operator convenience. Hundreds of attachments easily interchanged—125 types and sizes—models include vertical and horizontal type machines from 1/8 to 3 h.p. Distributors in all principal cities.

Send today for catalog showing complete line





N. A. STRAND & CO.

# WHITNEY- JENSEN PRODUCTS

### WE MANUFACTURE A COMPLETE LINE

of
Maintenance
and
Production
Tools and Machinery

WRITE FOR NEW CATALOG 17-46

WHITNEY METAL TOOL COMPANY

### MARKING AND CODE DATING MACHINE

Adolph Gottscho, Inc., code dating and marking machine specialists announce a new addition to their Markomatic family. This is designated Markomatic No. 9C.

This machine incorporates new interesting features. It is portable, adjustable, complete and easily adaptable. The machine is portable on a single caster in its base for marking operations in different locations from day to day. It is adjustable in all three planes for carton size variations. The Markomatic No. 9C stands on the floor and is complete in having its pedestal, column and switch. It is adaptable to mark objects on almost any conveyor and packaging or material handling machine on the market.

These advantages are in addition to the well known features of the parent unit. The No. 9 machines will mark moving objects without stopping them, will accurately mark in a designated space and on recessed surfaces and will afford instant synchronization between marking operation and product flow. This last feature is the most important of the Markomatic No. 9 group. By merely placing the machine and locating the switch, the marking is placed precisely on the

object. Regular spacing between or indexing of objects is not required. No

development is necessary.

The Markomatic No. 9C may mark as frequently as 80 imprints per minute. Object speed may be up to 100 feet per minute and a moving object receives its imprint from a flat die without smudge or blur. The No. 9C stands 50" high and occupies 16" x 28" floor space.

Deliveries of these units are prompt.

Deliveries of these units are prompt. Several installations are at present operating. For further information and specifications write Adolph Gottscho, Inc., Dept. BB, 1 Hudson Street, New York 13, N. Y.

### INTERNAL MEASURING

A new Precisionaire internal measuring instrument for the accurate checking of small rings from 5/32" to 1" internal diameter is announced by the Sheffield Corporation, Dept. BB, Dayton, Ohio. It also indicates taper, bellmouth and out-of-round conditions. The rings may be explored to a depth of 9/16" from each side by hand wheel vertical adjustment of the diamond tipped gaging arms.

Precision gage blocks are used in setting the instrument, which is of the comparator type. Amplification is approximately 35,000 to 1. Deviations from the master setting are said to be less than five millionths of an inch and are easily read, as each graduated space represents five millionths occupies 175 inches on the scale.

The Precisionaire internal measuring instrument is ideal for gage control room where master, inspection and working gages must be constantly checked. The smaller the ring, the smaller the gagemaker's tolerance and the wear allowance. Therefore, the greater the wear and need for frequent accurate inspection.

### WELDING TECHNIQUE

A revised edition of "Ampco-Trode Welding Technique", known as Bulletin W-2A, has been issued by Ampco Metal. Inc. The new edition features the welding of aluminum bronze electrodes by the carbon and metallic arc methods. It contains a weldability chart for copper-base alloys, listing 33 bronze alloys, their chemical composition, physical properties and detailed weldability data.

"Ampco-Trode Welding Technique" is illustrated by 22 photographs, sketches and diagrams and contains tables of recommended currents and voltages. Copies will be sent on request to Dept. BB, Ampco Metal, Inc., Milwaukee 4, Wis.



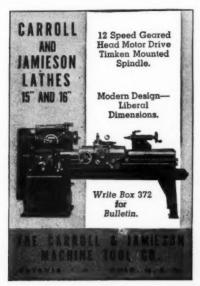
# FORM GROUND CARBIDE AND HIGH SPEED TOOL BITS

TERRITORIES OPEN FOR LIVE REPRESENTATIVES

NEW MILFORD CARBIDE TOOL CO., INC.

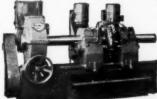
NEW MILFORD, N. J.

79 NEWBRIDGE ROAD



# Roto - Matie

A combination of precision workmanship and advanced design contribute to the quality of output and quantity of work pieces produced on Roto-Matics. Production far exceeds that of standardized equipment used in the metal working industries today, because practically all operations are continuous eliminating down time for loading.



No. 1-A MILLER

Catalogue 8-90 illustrating and describing various types of drilling, milling, reaming and boring machines is available on request.

DAVIS & THOMPSON CO.

MFRS. OF MACHINE TOOLS & MICROMETERS
MILWAUKEE, WISCONSIN



ALSO -

WRITE FOR LATEST BOOK-LET ILLUSTRATING "100 METHODS AND MACHINES FOR MARKING."

ACROMARK

15 MORRELL ST.

### SPECIAL VAPOR DEGREASERS

The Phillips Mfg. Co., 3475 W. Touhy Ave., Chicago 45, has produced two new Vapor Degreasers—The Phillips "Duo" and the Phillips "Super" Vapo-Kleen specially engineered for the automotive and aviation industries.



These degreasers use Phillsolv, a 100% non-inflammable cleaning solution which eliminates hazardous gasoline wash.

It is claimed that up to 80% is saved in labor costs by these degreasers thru their economical operation and by degreasing before disassembly.

The essential difference between the two models is that the Phillips "Duo" is designed to handle basket loads or parts up to 12" in diameter, whereas the Phillips "Super" is a heavy duty degreaser large enough to degrease complete motors. Both are completely self contained. They clean by dip, soak or vapor, or any combination of these. The "Super" reclaims its own dirty solvent automatically.

Complete data is available from the manufacturer.

### GAGE TEMPERATURE COM-PENSATOR

To provide accurate gaging of strip material continuously rolled on a cold reduction mill, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. announces a Temperature Com-

pensator to maintain zero setting for all conditions of temperature.

The P&W Electrolimit Continuous Gage, under conditions of constant temperature is accurate to .000025", but as the temperature changes such as it does in rolling, the gage reading varies from its original setting and this variation is actually a shift of the zero setting. The temperature compensator maintains a zero setting, namely; counter on zero and meter on zero—for all conditions of temperature, and this then makes the gage indication accurate for any setting thickness, whether the gage is cold or warm.

The P&W Temperature Compensator can be applied readily to any P&W Electrolimit Continuous Gage and installed in about 10 minutes. The only mechanical change on the gage is to replace the existing lower roll stud with the temperature compensator roll stud.

The Compensator eliminates the necessity of constantly checking the continuous gage with feeler gages during rolling, and provides an automatic means of indicating gage thickness accurately under varying temperature conditions.

#### **NEW SANDER MODELS**

New model XL50 and XL90 Easy Reciprocating Electric Sanders are announced. The Company reports numerous new features including floating pistol-grip type headle mounted on rubber; a more

features including floating pistol-grip type handle, mounted on rubber; a more powerful motor; perfected balancing; slide type switch mounted on side of handle, and other improvements.

It is claimed the new units are practically vibrationless, cut much faster, and are exceedingly simple to operate.

In both models the Company retains their original straight-line, reciprocating action that mechanically duplicates the back-and-forth motion of hand block sanding, rubbing, or polishing. The short rapid stroke develops but a little heat. It therefore has proven highly desirable for a wide range of new and refinishing applications on plastics, metal, wood, slate, leather or composition.

Detachable sanding pads are a unique feature of the Model XL90. A simple snap-action device permits instant attachment of the correct type of pad for the job. To insure maximum efficiency on flat, curved, wet or dry work, pads are furnished of felt, rubber, and other materials of desired shape, size, and degree of flexibility.

Write the Detroit Surfacing Machine Co., 7433 W. Davison, Detroit 4, Mich., for literature.



Gives any grade of finish to cylindrical work. Polishing wheel mount is heavy, with triple V-belt drive, Wheels can be trued in motion. Feeding speed is variable, the work support being adjustable with the feed unit. All parts are guarded but accessible, Construction is rigid and durable.

PRODUCTION MACHINE CO. Let us send bulletin giving full details

Greenfield, Mass.





### OUR EFFICIENT TOOL DESIGNING

### means better production at a lower cost

Efficient tool designing in post-war's competitive production is a "must". Our experience guarantees you tools—designed for economy of operation, resulting in your increased production at lower costs.

COLUMBUS DIE TOOL

| and Machine Co.

930 CLEVELAND AVE., COLUMBUS O ONLO

### ROLL TURNING TOOL

Kennametal Inc., Latrobe, Pa. has developed a line of broad-nose tools for turning cast iron rolls up to 90 Scleroscope. Preliminary performance claims of the manufacturer indicate major savings in production costs can be effected with these new tools. For example, they report, a roll that required 25 hours for rough grinding was turned with two 8" Kennametal tools in 8½ hours.

Kennametal Roll-Turning Tools comprise solid Kennametal Grade K6 blades, held in position on an accurate surface of the supporting shank by a clamp and serrated, advanceable back-up plate.

The Kennametal blade has four cutting



edges that may be used in succession before any sharpening is required. Then it can be reground many times, and advanced each time to cutting position, until 2/3 of the Kennametal has been utilized.

Complete particulars are given in Supplement 1 to Catalog 46, available from Dept. BB of the manufacturer.

## ROLL THREAD COMPARATOR WITH PRESSURE CONTROL

To inspect small diameter hard-tohandle screws of fine pitch, Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., announces the new Model C Roll Thread Comparator with Pressure Control.

Its use is recommended by the manufacturers for builders of fine instruments and related industries when thread inspection is necessary on screws of diameters ranging from .060" to .216" and threads of 80 to 28 per inch National Form 60°.

The screw is placed in the work holder where it is held on its major diameter. The operating lever is depressed and the screw is presented to the gaging rolls. The light is always on except when excessive pressure is applied at which time the light goes out. This feature is especially important because of the tiny



size of the screws being checked. This gaging pressure is adjustable to suit the work. Write Dept. BB for further information.

### 2-STAGE DRILLING MACHINE

Special purpose two stage machine for milling the bosses or cylinder head castings, has been completed by Hydraulic Machinery, Inc. 12825 Ford Rd., Dearborn,



Mich. The machine is hydraulically operated and electrically controlled. Cycle of operation: 1—Operator unloads and loads part in station away from work position 2—While this is being done, milling head moves in, machining part, at work station 3—Milling head retracts 4—The part the operator has just loaded moves into work station (5) repeat, Dimensions: 48" wide x 60" high x 72" long. For more details write the company, to Dept. BB.



FOR FUSION LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A

free loop of material is supplied to automatic feed, regardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Pres-Vac Safety Feeders, REQUEST Mechanical Pickers, etc.

F. J. LITTELL MACHINE CO. 4153 Ravenswood Ave., Chicago 13, III.

### MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD CAP SCREWS



SAFETY HOLLOW SET SCREWS

Try Them On Your Next Job!

MACHINE PRODUCTS
COMPANY

5207 Lawrence Ave.,

Chicago, Ill.



### McMAHON'S Magnetic Blocks

V-100 Magnetic Block

30-45-60° Angle, with Brass Separators, Brazed in place. Size  $2\frac{1}{2}$ "x $2\frac{1}{2}$ "x $3\frac{1}{2}$ " long. Priced \$35.00 each.

K-125 Magnetic Parallels

Sold in Sets of Two Blocks, with Bakelite Separators. Size, 1-3/32"x21/4"x4" long. Price, \$14.05 per Set.

Write for Descriptive Literature.

FRANK McMAHON COMPANY
142 S. JUNE ST. DAYTON 3, OHIO





### PLUNKET QUICK ACTION VISE for DRILL PRESS or MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws.

Eccentric motion moves jaw 5/16".

Size
6" jaws, 1½" deep, opens 4".....\$46.20
Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.
Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grieders

WRITE FOR CATALOG

J. E. Plunket Machine Co. 1823 W. Lake St. Chicago 12, III.

#### NEW TYPE ABRASIVE WHEELS

Bayflex raised hub disc wheels, manufactured by Bay State Abrasive Products Co., represent, according to the manufacturer a new type of abrasive wheels. They have a wide spread application, especially in the field of welded or brazed metals, and already being used in foun-



dries, sheet metal shops, and welding shops. They are also valuable in grinding aluminum castings,

Among their advantages is the fact that the edge can be used for grinding and even cutting off. Bayflex discs can be used right down to the nut. On the rare occasions when lead or paint might tend to "load" the wheel, it can be cleaned quickly by touching the face on a concrete surface.

These wheels fit any standard machine formerly employing coated discs, and are available in the same grit size.

The manufacturer will be pleased to send upon request an illustrated descriptive folder outlining the advantages of these new wheels, write Dept. BB. Bay State Abrasive Products Co., Westboro, Mass.

#### SWITCHBOARD DEVICE TESTING

A new test switch for rapid, accurate testing of switchboard instruments, meters, and relays from the front of the board is announced by Westinghouse. Designed with up to ten elements and rated at 250 volts, 30 amperes, combinations of current and potential switches are included as required for the various types of instruments to be tested.

Safety and accuracy are increased by constructing the switch so that a plug properly connected to the test instruments can be used to check from the front of the board in rapid succession all meters or instruments of a particular type.

Individual switches are of the knife blade type and separated by barriers. Moldarta switch handles are recessed for inserting identification cards. Each switch handle is drilled for insertion of an interlocking bar to tie together any three adjacent handles. The right hand switch, when used for a trip circuit, is provided with a red handle for easy identification. Means are provided for the attachment of spring clips when individual test leads are used instead of a test plug. From the Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

#### PISTON RING TESTING

Said to give speedy, highly accurate piston ring measurements, this new piston ring gauge was developed by Gulf Research & Development Co. in cooperation with the aviation industry. In effect it consists of 18 Solex gauges, or air fingers, measuring the pressure at all points on the piston ring circumference.

The pressure is recorded on the mercury columns. Only 15 seconds are required for testing of a ring and the device may be set up to take rings from 6\% inch to 2\% inch according to the man-

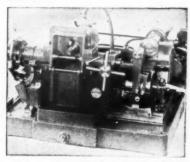


ufacturers. The new piston ring gauge is now being used also in the auto industry.

Information on this and other activities of this company may be had by writing to Gulf Research & Development Co., Dept. BB, Harmarville, Pa.

### PINION AND GEAR CUTTING MACHINES

Waltham Pinion and Gear Cutting Machines have long been available for cutting gears up to 1½" or pinions ½" diameter. A larger machine for 4" diameter work has also been supplied. For a unit in between, a machine with capacity up to 2½" pitch diameter with 2" length of cut is offered.



The machine may be used for bench operation, or a pedestal is available. Motor and control are attached to the machine. It is a single cutter machine, with the revolving cutter making successive cuts on blanks held and indexed by the work spindle and supported by tail center. Only straight teeth can be cut.

Automatic from start to completion of last cut, machine stops with cutter lifted clear of work thus permitting easy and quick loading and unloading. The reservoir base can be cleaned from the front.

The standard work slide cam allows an adjustment of strokes between 1.4" and 2.4". For pinion work a shorter throw cam can be furnished. Unless otherwise called for, a 120 division index is furnished with



the machine. With this index and an adjustment of the indexing mechanism, either 6-8-10-12-15-20-24-30-40-60 or 120 divisions may be obtained. Other numbered division indexes are obtainable.

Cutters used on this machine would regularly be 1" diameter with %" hole, but if necessary, arbors for other dimensioned cutters can be supplied.

This new machine is now offered by Waltham Machine Works, Dept. BB, Waltham, Mass.

### TWO NEW HYDRAULIC PRESSES

An advance in the high speed handling of sheet metal fabrication is claimed for two new hydraulic presses of 25-ton and 50-ton capacities recently added by the John S. Barnes Corp., 145 Walnut St., Rockford, Ill., to its line of hydraulic metal working equipment.



Designed for the piercing, punching, forming, and drawing of sheet metal parts, these presses have combined the functions of several presses into one compact machine.

As a result, a number of economies are claimed, such as, less handling, reduction of production costs, increase of production rate, reduction of rejects, due to accuracy of new operating methods, "down" time of machine is cut.

These presses are said to be built to withstand excessive punishment.

Each press is powered by a Barnes Self-Contained Hydraulic Unit which is claimed to insure smooth press operation, constantly under fingertip control. Dual electrical controls increase safety and flexibility of operation.

# Available LITERATURE

### TREATMENT OF ALUMINUM ALLOYS

While aluminum alloys have risen to the ranks of our important metals, little information on heat treating them has been available. To meet this need, Reynolds Metals Company has prepared a treatment of the subject in its new process manual, "Heat Treating Aluminum Alloys." It is readily usable by both the non-technical man and the highly trained technician.

The first section breaks down the subject into easily understandable concepts which the non-technical reader can follow and so obtain a basic understanding of the metallurgy and heat treatment of the aluminum alloys.

Section Two presents in brief tabular form the recommended thermal treatments for the various aluminum alloys.

Section Three is for the metallurgist and operating personnel. There will be found a more technical discussion of the various thermal treatments as well as detailed information on possible difficulties and suggestions for their cure.

It contains 144 pages, 81 illustrations, 13 tables, 18 photomicrographs, 2 charts, and is 6 x 9". The books are available from Reynolds Metals Co., Dept. 47, 2500 So. Third St., Louisville 1, Ky., at \$1.00 each.

#### BULLETIN FOR FIXTURE CLAMPS

Just published is Wespo Bulletin No. 14 describing and illustrating 5 types of Wespo fixture clamps—including rapid action clamps. These fixture clamps can be incorporated in the tool designer's fixture layouts.

A 28-page book of exact scale template drawings of Wespo clamps, parts and accessories is available free, to any tool designer or mechanical executive requesting it on his company letter-head and including his own title. West Point Mfg. Co., Dept. BB, 19625 Merriman Court, Farmington, Mich.

### CARBIDE TECHNICAL CATALOG

Vascoloy-Ramet Corp., North Chicago, Ill., has released a new 32-page technical catalog on improved carbide tools and blanks designed to meet the tool requirements of post-war production.

The catalog lists and illustrates nearly 500 standard tools and blanks, more than 175 of which are new or revised items, such as shell end mills, solid and tipped boring tools, threading tools, face mill cutter blades, step cutter blades, scraper blanks and carbide tipped scribers.

It features ten pages of tool engineering information gathered from Vascoloy-Ramet's experience. Facts are included concerning coolants, speeds and feeds for turning, facing, boring and milling various kinds of steel, cast iron, non-ferrous metals and non-metallic materials. Write to Dept. BB, of this company.

#### SAFETY GUIDE

A body safety guide which classifies hazards by industries and recommends the proper safety clothing and equipment for maximum protection has been published by American Optical Company, Dept. BB, Southbridge, Mass. Free copies can be secured by writing the company.

The guide classifies 21 hazardous types of work found in the 18 industries listed, includes also pictures and descriptions of different types of safety clothing which should be worn for protection against each hazard.

#### PRECISION GAGES

New Steel—Chrome Plated—Tungsten Carbide—Norbide Precision Gages are described in a 4-page catalog just released by Sturdy Tool & Gage Co., Dept. BB, 14520 Schaefer Highway, Detroit 27, Mich.

Sturdy is specializing in the manufacture of jigs, fixtures and non-cutting tools of new steel, chrome plate, Stellite, tungsten carbide and Norbide.

### TOOLING METHODS

Barnes Drill Co. has released a new bulletin, "Fixtures and Tooling," which describes methods for low cost, rapid handling of a wide variety of work.

Application of Hydraulic Production Units, and Electrical, Pneumatic or Manually operated holding and indexing means is illustrated by views of actual machine set-ups on Honing, Drilling, Tapping, Reaming, Threading and other operations. Typical results are shown in time and production figures.

It is said by the manufacturers to be possible thru these specially engineered set-ups, to facilitate machining of multiple surfaces, or successive machining operations simultaneously. Maximum efficiency is attained at minimum operating costs.

Write the Barnes Drill Co., Dept. BB, 814 Chestnut St., Rockford, Ill.

### WORKING ON SMALL PARTS

A 16-page bulletin has been issued by the Ettco Tool Company, Inc., 596 Johnson Ave., Brooklyn 6, N. Y. This bulletin covers the Ettco-Emrick system and equipment for multiple drilling and tapping of small parts.

Included in the illustrated bulletin are the fundamentals of their system; details of the multiple spindle methods; drilling or tapping by "automatic electricair" operation; working simultaneously on more than one surface.

Engineering service is offered by the Ettco Tool Co. By sending them details of your needs you will receive information on the best way to meet production requirements.

#### FUEL OIL BURNERS

A bulletin describing Low Pressure Fuel Oil Industrial Burners has recently been published by the Dempsey Industrial Furnace Corp. This is an 8-page 8½" x 11" bulletin with many illustrations, specifications, and tables.

These burners may be used with either manually or automatically operated temperature. The manufacturer reports that these burners will operate equally well with any fuel between kerosene and preheated Bunker "C" oil.

The publication is designed to facilitate ease and speed of use. Detailed information and engineering service is available for specific problems. Write Dept. BB of the company at Springfield, Mass.

### GEARSHIFT DRIVES

A six-page bulletin designed for easy reading has been announced by the Lima Electric Motor Co., 244 Findlay Rd., Lima, Ohio.

Described and illustrated are their Gearshift Drives, Electric Motors, Pedestal Grinders and Polishing and Buffing Lathes.

The manufacturers report that their Gearshift Drives are designed to provide greater machine tool and plant layout flexibility.

Lima engineers have combined a fourspeed sliding-gear transmission and an induction motor into a single unit. A series of transmission sizes are matched to a large number of motor hp and speed ratings to make up a complete line of drives from ½ to 20 hp.

### CONVEYOR LITERATURE REVISED

A newly revised six-page folder entitled "Your Man Friday" describing the Stevedore, Jr. power belt conveyor has just been issued by The Rapids-Standard Company, Inc., manufacturers of material handling equipment.

The two-color folder includes descriptions and photographs of all latest developments on this belt conveyor. Typical installation photographs of the Stevedore, Jr., in use thruout industry are presented in the folder. Detailed specifications also are listed prominently. Close-up photographs show the Stevedore, Jr. self-supporting adjustable head and tail sections and the patented Rapid-Lock support with horseshoe dolly base.

Copies of the folder, Form SJA-46-6, may be obtained by writing to the Rapids - Standard Co., Dept. SB-249, 308 Peoples National Bank Bldg., Grand Rapids 2, Mich.

### FLEXIBLE SHAFT MACHINES

New additions and present models of the Wyzenbeek Flexible Shaft Machines, High Speed Grinders, tools and accessories are illustrated and described in a new 16-page, 2-color folder published by Wyzenbeek & Staff, Inc., 841 W. Hubbard St., Chicago 22, Ill.

Included in the "Wyco" line are Flexible Shaft Machines from ¼ to 2 hp; High Speed Grinders from 1/18 to 1 hp; sanding drums, brushes, buffs, grinding wheels, cutters and others available for delivery. Detailed specifications and prices are listed for all items.



#### SEAM WELDERS

An 8-page, two-color folder (Bulletin No. 803) with information on the design, operation, and applications of its improved standard and special seam welders has been made available by Progressive Welder Co., Dept. BB, 3050 E. Outer Drive, Detroit 12, Mich.

Typical applications of Progressive standard seam welders and pictured, including the welding of a cylindrical cup to a flat circular plate; welding gas tanks; welding 22 gage steel tubes at 15 feet per minute; and a dual-duplex seam welder—with an indexing table that welds two seams, indexes, and makes another pair of seams of different widths.

### OIL PURIFICATION INFORMATION

Volume 2, No. 3 of "Clean Oil", a pictorial publication devoted to oil purification, issued quarterly by Honan-Crane Corp., is now available on request.

This issue is devoted almost entirely case histories of oil purification equipment, covering specific applications on hydraulic equipment used in the manufacture of plastics, metal products, drop forgings, grinding wheels and abrasives, as well as on transformer oil in electric light and power plants.

For copies write to Honan-Crane Corp., Dept. BB. 911 Sixth St., Lebanon, Ind.

#### LARGE CATALOG OF TOOLS

Whitman & Barnes, organized in 1848, 2108 W. Fort St., Detroit 16, Mich., has announced a new catalog known as No. 100.

New from cover to cover the catalog contains 202 pages. In addition to the regular line of tools manufactured by this company many other tools are shown.

The catalog also contains information pertaining to the design, construction, use and care of drills and reamers, and should be of interest to all users of these tools. Write to Dept. BB of the company for this catalog.

### INDUCTION HEATING

Induction heating and melting are described in a new data-packed bulletin available from Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J. Bulletin No. 27, describes the principles and advantages, and shows many ways to use high frequency to speed production, reduce costs, and hold closer tolerances in melting, heating for forging, brazing, annealing, etc.



### BAKER No. 150 Heavy Duty Drill UNIVERSAL QUICK CHANGE

Baker machine tools, as shown in the Model 150 Universal Quick Change Drilling Unit illustrated, are made for rugged work. All materials are highest grade, and workmanship unsurpassed.

The Model 150 is completely equipped with the finest features possible. Write for our illustrated folder giving specifications and details.

Machine users who purchase Baker tools that were used during the war, are invited to write us regarding equipment conversion problems, including rebuilding or retooling with different heads, attachments and fixtures. Requests should include serial numbers of machines.

> Baker dealers in all parts of the country will be glad to assist prospective buyers with advice and information on Baker equipment.

> BAKER BROTHERS, Inc.

## SILENCE YOUR SCREW MACHINE DEPARTMENT

### **C-T SILENT STOCK TUBES**

- Easily installed
- Unexcelled in noise elimination
- Built for long, lasting wear
- · Low in cost

#### NOISE ELIMINATION:

Reduces Job Fatigue Increases Efficiency Improves morale of all within hearing

### ORDER A TRIAL INSTALLATION

Illustrated Circular
And Price List Upon Request



For Single Spindle Machines

For Multiple Spindle Machines

Tubes for No. 00 B&S \$18.00 for No. 2 B&S 1%" cap. \$27.00 Delivery on most tubes from stock.

CORLETT-TURNER CO., Dept. 21, 4011 W. Lake St., Chicago, III.

### PRECISION PARTS ASSEMBLIES

Commercial Heat Treating

**Electro Platina** 

Viking H. S. Tool Bits

Special Taps

### AGERSTRAND CORPORATION

MUSKEGON, MICHIGAN

### PRECISION COUNTERSINKING .. FASTER! WITH THE AERO MICROMETER STOP COUNTERSINK iers's What This Versatile, Dependable Tool Vill De For You: ALL PURPOSE: countersinks and counterbares, both in metal and in plastics. ACCURATE: necurately limits depth of cut, regardless of surface variations. PREVENTS BUCKLING: aliminates buckling troubles in countersinking sheet metal.

TOUCH CONTROL: Anger-tip pressure adjusts depth in increments of ,601, without removing tool from drill press, AUTOMATIC LOCKING: no accidental adjustment, absolute uniformity of cutting depth.

HAND OR MACHINE: designed for efficient use in either hand tool or drill press.

LOW COST: \$7.25, without cutter. Cutters (HS), \$1.75. IMMEDIATE DELIVERY: your order filled by return mail.

AERO	TOOL	COMPANY	BURBANK, CALIFORNIA

Attest my store re	w Micrometer Step Countersink
Specify exiter angle	Pilot dia.
Please send me free, illustrate	ed breehure.
Neme	Title
Company	

### ROLLER HEARTH FURNACE

A 4-page Bulletin, No. SC-132 by Surface Combustion Corp., Toledo 1, Ohio describes 'Surface' Prepared Atmosphere Roller Hearth Furnaces for Ferrous and

Non-Ferrous Bars, Tube and Strip.

The most practical and economical means of minimizing decarburization and preventing scale in continuous furnaces is included. Proportioning Burners of 'Surface' furnaces which may be used to anneal non-ferrous metals such as copper and brass with minimum surface oxidation and the entirely external continuous chain and sprocket drive from every roller in 'Surface' Roller Hearth design are other features presented. Furnace operating data is also given. Write Dept. BB.

### AIR-AND-HYDRAULIC DEVICES

A completely new 64-page catalog of "Airgrip" Chucks, Cylinders, and Valves has just been issued by Anker-Holth Manufacturing Co., 2729 Connors St., Port Huron, Mich.

More than 150 illustrations include product photographs emphasizing Anker-Holth special features; numerous blueprints and diagrams showing product dimensions and complete information on models and sizes, etc., as well as dozens of application pictures.

### HERCULES PRODUCTS BOOKLET

A new four-color, non-technical, illustrated booklet, "A Trip Through Hercules Land", which explains how Hercules Powder Company products are utilized in twelve major industries, is now available.

In addition to the more complete story of the use of Hercules products in the twelve major industries this new book also includes a list of 51 industries and the Hercules products utilized in each of the industries.

For this booklet write to Dept. BB, Hercules Powder Co., Wilmington 99, Delaware.

#### FRICTION TAP HOLDER

A 2-color folder has recently been released which describes in detail the Pro-cunier style "C" Friction Tap Holder. De-signed for use on reversible machines, this friction tap holder allows the op-erator to control the amount of power needed to drive the tap within the capacity of the tap holder.

This folder is available from the Pro-cunier Safety Chuck Co., 14 S. Clinton St.,

Chicago 3, Ill.

### MICHIGAN TOOL BULLETIN

A four-page folder (Bulletin No. 789) announcing its new line of standard Cone-Drive gear sets; standard Cone-Drive pinion and gear mountings; and standard Cone-Drive speed reducers has been issued by Michigan Tool Company, Dept. BB, 7171 E. McNichols Road, Detroit, Michigan.

Tables of horsepower ratings for speed reducers and Cone-Drive gear sets and information on cooling speed reducers are included in the folder.

#### GAS CARBURIZING FURNACES

A new bulletin on gas carburizing furnaces for the mass-production industries is announced by Holcroft & Co.

This bulletin briefly describes the controlled-atmosphere gas carburizing process which was developed by Holcroft and outlines its inherent advantages. Numerous possible furnace design features are listed. Typical Holcroft mass-production gas carburizing installations are illustrated and described.

Copies of the bulletin are available on request from Holcroft & Co., Dept. BB, 6545 Epworth Blvd., Detroit 10, Mich.

### STAINLESS STEEL SELECTION

Characteristics and applications, analyses, mechanical and physical properties of stainless steels which Summerill Tubing Company regularly draws in the form of round seamless and redrawn welded tubing, is available in a new publication, "A Guide for the Selection of Seamless and Redrawn Welded Stainless Steel Tubing".

Copies are obtainable from Summerill Tubing Company, Dept. BB, Bridgeport, Montgomery County, Penna.

#### SELECTION OF ALLOY STEELS

For some time, engineers, master mechanics and maintenance men have looked for ways to simplify the selection of alloy steels to meet specific requirements.

To help alloy steel users interested in a simplified program Carpenter has published a booklet "2 Steels Simplify Your Alloy Needs." The booklet can be secured by addressing The Carpenter Steel Company, Dept. 12-Y, 314 W. Bern St., Reading, Pa. Multiply
Operations!
of your
MACHINES

with

## SPEED PULLEYS

WIDE V-BELT SERIES



Available as Complete drive.

Easily installed

Ratios: 3 to 1 1/4 to 8 h.p.



Finger-tip control for desired speed. Provides change of speed for all variations in stock, size, temperature, etc. Compact. Self-aligning. Also supplied in standard V-Belt series, for fractional h.p. drives. Send for complete Catalog. Includes "Select-O-Speed" Transmissions, Sheaves, Wide V-Belts, etc.

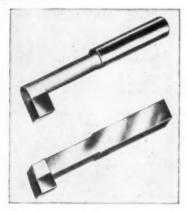
Manufactured by

### LOVEJOY FLEXIBLE COUPLING CO.

Mfrs. of Lovejoy Flexible Couplings 5026 W. Lake St., Chicago 44, Ill.

#### BORING BITS

Some new Star Carbide Tipped Boring Bits have recently been introduced to the market. These are offered in both round and square shanks, as shown in the illustration. They are also divided into two grades—for cutting steel and for general purpose work.



The manufacturers recommend these new Bits where a fine finish is required in production work.

The shanks are made of heat treated alloy steel and extra thickness is provided under the carbide tip to give added support for heavy cutting.

These Bits are available for immediate delivery from the Samuel S. Gelber Co., Dept. I, 542 W. Washington Blvd., Chicago 6, Ill.

### DUPLEX MILLING MACHINE FOR SMALL PARTS

The Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Illinois has designed and built a new small duplex type Rigidmil of the No. 0 size. This new Rigidmill mills two surfaces simultaneously on opposite ends of small work pieces such as lock, key, typewriter, gun and business machine parts and light cuts on larger work pieces.

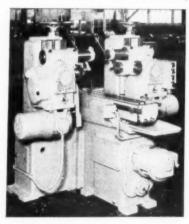
The machine has two horizontal opposed spindle heads which have independent vertical adjustment from 2 minimum to 13" maximum from top of table to center line of spindle. Thus, cuts

on opposite ends of part can be made at different relative heights.

Spindle heads are of independent motor driven type. Either 1 or 1½ hp motors can be used. Heads are available in 2 speed ranges of 25 to 1200 rpm or 50 to 2400 rpm. Speed changes are by pick-off gears and each set of 2 gears provide 4 possible speed changes.

Each column has 3 fixed positions 1¾" apart which provide a total increased spread of 7" between spindle noses.

The machine has an 8" x 41½" long table. The maximum table feed stroke is 12" and rate of table feed is infinitely



adjustable between ½" and 38" per minute. Rapid traverse rate is 325" per minute. Both feed and rapid traverse movements of the table are controlled hydraulically by a Sundstrand hydraulic feed unit mounted in the machine base.

#### DROP TABLES

"Servicing Modern Power with Whiting Drop Tables" (Bulletin DT-C-403) is the title of the new 36-page catalog just published by Whiting Corporation, Dept. BB, Harvey, Illinois.

This two-color book, illustrated with 58 photos and 26 diagrams, describes the construction, operation, special arrangements, accessories, and modified designs of Whiting Drop Tables for diesel, electric, and steam locomotives. Practical suggestions for pit construction and track layout are also discussed.

### ANNULAR FORM GRINDER

A precision annular form grinder is announced by the Sheffield Corporation, Dept. BB, Dayton, Ohio, as the latest addition to its line of grinders and machine tools. This new machine utilizes the "Crushtrue" principle of wheel dressing for the rapid production of annular and cylindrical forms such as circular form tools, crusher rolls, ball bearing seals, seaming rolls, shift grooves in automotive and farm implement transmission gears, and other similar forms of intricate and precise profile.

This machine tool is similar in some respects to the Sheffield Thread and Form Grinder, Model 101, which has been on the market for several years. However, the work head and work head drive are

completely new.

A variable speed geared-head motor drives the work head spindle in either direction thru pulleys and two V belts over a spline shaft required for table po-sitioning. Standard work speed range is 60 to 360 rpm and may be varied in infinite increments.

A hand crank engages with the lead screw and is used for table positioning. A precision spacing attachment, using the standard gage blocks and dial indicator, is available as an accessory.

### PARTS LETTERING AND NUMBERING MACHINE

To meet the need for a machine that will stamp lettering and numbering into a wide variety of parts and name plates. the new Acromarker No. 1AR has been developed by The Acromark Co., 15 Morrell St., Elizabeth, N. J.

This new marking machine is about the size of a No. 3 Arbor Press. Similar construction to that of an arbor press is utilized in the frame and the ram. The lettering and numbering head is set into the lower end of the ram in a double-row precision ball-bearing arrangement and an indexing arrangement at the back of the head insures positive positioning of each character.

To stamp in a curved line, a rotary fixture is placed on the marking table and a worm gear rotates the fixture holding the part. The illustration shows this

arrangement.

Specifications—Die Head sizes, interchangeable, 1/16" to 3/16" Overall Machine size—30" high (ram up), 12" wide, 24" deep, weight—200 lbs. Delivery 2-4 weeks

### DRAFTING PENCIL

A new, aluminum drafting pencil, known as the Elastichuck Pencil, has been introduced by the Elastichuck Sales Company, Inglewood, California. The pencil features a rubber collet in the neck of the chuck which grips the lead and "cushions" it against undue pressure, thereby eliminating unnecessary leadbreakage. The rubber collet is the only contact between lead and pencil, and is a great improvement over conventional metal-type chucks that do not yield to extra pressures.

It is claimed that the hardened steel chuck cannot be damaged when sharpening leads against a file or sandpaper pad. The chuck is knurled for those who grip a pencil close to its point. The barrel is also knurled for normal grip and is tapered for perfect balance. Metal is highly polished, will not stain or rust. A rollstop keeps pencil from rolling off inclined

drawing boards.

The company also packages leads for Elastichuck Pencils, Elastichuck Eraser Holders (with or without typewriter brush), and rubber refills for eraser hold-ers. Write to Dept. BB for more information.

#### MANIFOLD COUPLING

Marman Products Co., Inc., announces a new high temperature manifold counling which affords a positive seal for all types of manifold joints operating under condition of high temperature and ex-cessive vibration.

Wedging action of the retainer ring draws together the flanges of the mani-fold joint as the coupling is tightened. High axial component of the clamp band tension that is transmitted into wedging action provides a positive seal.

One of the outstanding design features announced for the new coupling is the vented construction of its retainer ring which makes it possible for the coupling to remain at one-half the temperature of the manifold, giving an increasingly positive seal as the temperature of the manifold rises.

Any manifold equipped with machined or rolled flanges similar to cross-sections shown can be efficiently joined with this new coupling.

Additional information about this as well as many other types of manifold couplings is available in Marman's new engineering catalog. Write Dept. BB, Marman Products Co., 940 W. Redondo Blvd., Inglewood, Cal.

## Mechanics Through the Ages



## Announcing the NEW LOVEJOY

### DOVETAIL CUTTER

The new Lovejoy Dovetail Cutter offers a faster and more economical method for forming dovetails, milling vee-slots or cutting angles: For example, the outstanding performance of the new cutter is clearly shown in the following data collected on a typical job.

OPERATION: M

Milling Dovetail Slots

MATERIAL:

Cast Iron

FEED:

13 inches per minute

SPEED:

200 r. p. m.

DEPTH OF CUT:

1/2 inch

TIP MATERIAL:

883 (Tungsten Carbide)

RAKE ANGLES:

+ 2 degrees Radial, 0 degrees

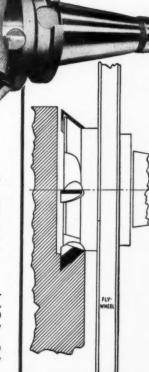
Helical

PERFORMANCE:

The 6-inch 6-bladed cutter was run with a 70 lb. Flywheel. The cutting action was free and even finish very smooth. After running 1400 lineal inches to complete the job, the blades showed inappreciable wear.

Such productive ability results from functional design that embodies the most modern metal cutting features — inserted-type, carbide-tipped blades for utmost economy—a rugged forged steel cutter body for maximum blade support—and the famous Lovejoy Positive Blade Locking Device.

With speedier, cheaper, accurate production, the result of using the new Lovejay Dovetail Cutter, it will pay you to write for complete details.



LOVEJOY

Springfield, Vermont, U. S. A.



GRINDS
MILLS
DEBURRS
ENGRAVES
POLISHES
FINISHES



Speed with power with precision—that's the new PRECISE 40. Surpasses our own PRECISE 35 which outworked every tool in the field. In strong, light plastic case, PRECISE 40 weighs only 40 oz.—packs a record 1/5 H.P. New type quill mounts precision collet chuck or grinding wheel arbors of various sizes; push-button spindle lock for quick tool change, 90% greater cooling; four oversize ball bearings. Quickly lubricated by pressure gun through ball-valve inlets. Tool mounts in vise, lathe, stand, or milling machine or can be used with PRECISE accessories for special applications. Guaranteed shockproof without ground wire,

Send for this 6-page Bulletin
PRECISE PRODUCTS COMPANY
1331 CLARK ST., RACINE, WISCONSIN

### PRECISE 40

### PRODUCTION CONTROL REPORT

The debates and discussions concerning the nation's basic defense and war policies and the gradual steps toward control of production have all been recorded in the five-volume edition of the minutes of the War Production Board and its predecessor agencies.

The five volumes cover the minutes of meetings of the Advisory Commission to the Council of National Defense, the Council of the Office of Production Management, the Supply Priorities and Allocations Board, the War Production Board, and the Planning Committee of

the War Produc-

They constitute Documentary Publications Nos. 1 to 5 of the War Production Board "Historical series, Reports War on A d ministration", which are being made public by the Civilian Production Administra-tion, successor to WPB.

May, Roose-In President velt set up the Council of National Defense and the Advisory Commission to the Council, under an act of August 29, 1916. The Advisory Commission consisted of seven members, each covering one seg-ment of the economy and directly responsible to the President.

The advisor on industrial production was William S. Knudsen; on industrial materials, E. R. Stettinius, Jr.; on employment, Sidney Hillman; on farm products, Chester C. Davis; on price stabilization, Leon

Henderson; on transportation, Ralph Budd; and on consumer protection, Harriet Elliott.

Questions that were to become major issues in later days were first tackled in the meetings of the Advisory Commission—among them the expansion of manufacturing facilities.

Balancing and controlling the economy in its sharp swerve from slightly underactive peace production to a sky's-the-limit war production system presented difficult problems right from the start, which only grew more intricate and urgent as time went by.



### The Lyon INTERNAL GROOVING TOOL

Its versatility saves costly preparation time — provides precision grooving of single or multiple grooves at a production rate — plus economy of set-up time — and low initial cost. The LYON has been designed for making internal grooves to tolerances of .001" using any drill press, turret lathe, radial drili or automatic equipment.

By changing only bushings and cut-ters within the tool model range, you have at your command a wide variety of bore sizes and shapes. A simple adjustment regulates location and depth of groove. Work cannot be scratched or marred because the head of the tool does not turn when the cutter operates.

Our Engineering Department will welcome the opportunity of discussing any grooving problem without obligation.









### UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

With Modern

43 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

JOHNSON MACHINE AND PRESS CORP.,

ELKHART.

Machaniam

### DIE FEEDS FOR PUNCH PRESSES

Two new punch press feeds, providing for more complete coverage of the wide range of and stock sizes feed lengths countered in the metal stamping industry, have been announced by the H. E. Dickerman Mfg. Co., Dept. BB, Springfield, Mass., manufacturers of the Dickerman 2" & 4" hitch feeds and 3" die feed.





or more, and approximately double the stroke on others.

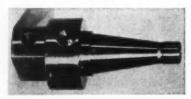
Feed lengths are adjustable from 0" to the maximum of 6" in increments of .001".

A twin operating cam is furnished for attaching to the punch holder or press ram. Because they require no connection to the power shaft of the press, the feed and required die set may be set up at will on any idle press.

#### PRECISION BORING HEAD

A precision Boring Head combining rigid construction, simplicity of design, full offset in either direction, and maximum tool rigidity is the claim of the R. W. Runde Machine Tool & Die Company.

Boring bars are held in either perpendicular or parallel position to the face of



the head. These heads come in several models. In the perpendicular position the various tool holders have depths of 1" 1\%", 1-13/16", and 3\%". The corresponding bearing sizes which may be passed in the parallel position are 2". 2\%", 3\% and 9".

Other features are special arrangements for facing or routing tool and double offset capacity when tool is used in off-center position. The largest model is designed with a lock for the shank, allowing the head to travel in either direction.

A line of accessories is available from the same company, such as Friction Lock Adapters and Shanks. These include Standard Tapers, Morse Tapers, Brown & Sharpe, Straight Shank and Van Norman. These are hardened and threaded 1¼ x 20. Special sizes or types of shanks may be built on request.

For illustrative literature and further details, write Dept. BB, R. W. Runde Machine Tool & Die Co., Saginaw, Mich.

#### PORTABLE ARC WELDERS

Anyone can weld with their Even-Flo Arc Welder says the Continental Farm Machine Co. This machine is supplied with large wheels and convenient handles to make it readily portable. The machine is furnished complete and

The machine is furnished complete and ready to use. Included in the kit are a helmet, welding cables, electrodes, ground cables, instruction book, welding rods and copper inlet wire.

This was designed as an all-purpose welder and is reported to be compact, sturdy, and very easy to use.

For descriptive matter write Dept. BB, Continental Farm Machinery Co., Minneapolis, Minn.

### CONVERTING THE LATHE

Different ways in which engine lathes can be and been conhave verted, to increase their output, or to make them suitwork for lathe than work as such, are interesting to any plant manager, for cases are always arising in which such methods can be employed with either temporary or permanent Various profit. manufacturers small bench lathes have been providing special production attachments for these machines of recent years, which really convert them into small turret lathes. or hand screw machines. One line of such lathes particularly in mind may be fitted with lever-type collet chucks, with a special carriage slide, having a 4-way tool post turret and an auxiliary back slide tool post, with tailstock turrets having 6 tool positions, and with multiple - stop at-

tachments for gauging lengths of various cuts. These auxiliaries make such small lathes highly versatile and productive.

Another aspect of bench lathe conversion has to do with changing it temporarily into a milling machine. Different firms have produced fixtures or attachments for milling in the lathe. One such attachment is equipped with a base that clamps in the tool post slot on the lathe carriage. This base is attached to a special slide, and provisions are incorporated for positioning this slide at any desired horizontal or vertical angle. Along this slide, by means of hand crank action,



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a combined vise, housing and work-holding collet assembly is traversed. The milling cutter is held and rotated in the lathe spindle. Indexing facilities are provided for the work-holding collet, which is used for various kinds of round work. When types of work other than round are to be milled, the collet spindle and its housing are removed from the vise, leaving only the vise on the slide for holding the work, and traversing it past the milling cutter in the lathe spindle.

Did you know that threading dies have been applied to engine lathes with success, using a sleeve-type tool to hold die.

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### LATHE STOPS

Different kinds of lathe stops found in use carry a great deal of interest, since they save a large amount of time. They also allow unskilled operators to produce accurate work, once they have been properly set up in relationship to a given job. Many are now using 4-way turret tool posts on their engine lathes, these having been made available from different sources. If, in connection with the four tools carried on such a turret, a multiple type of stop be employed for the lathe carriage, one really has a pro-duction machine. One multiple stop of

this kind is pro-vided with six long adjustable screws, held in a rotating body, 60 degrees apart. These stop screws may be set in different longitudinal positions, and engage a boss screwed onto the traverse carriage of the lathe. By set-ting each of these stop screws to the desired length of carriage travel, six different cutting operations on one piece of work can be established, as to their stopping points. Special facilities are pro-vided for locking each of the stop screws rigidly in position, once the correct setting has been obtained.

On some lathes. where very long cuts are being made, and where it is helpful for an operator to be able to walk away from the lathe while the cut is in process. giving his attention temporarily to other matters, a single type of stop is often used for the carriage. This stop, it has been

noted, is used in different ways in different places, depending on the work being done. It can be used as a fully automatic device, stopping the lathe carriage at the point desired, and for which it is pre-set. It is sometimes used as a semi-automatic device, bringing the carriage to a stop at a point about 3/16" before the end of the cut. The operator then advances the carriage by hand for this small amount, to a stop set on the gauge. In a few cases, it is used for manual operation.

A lathe spindle stop is used by some operators, where material is being worked to accurate lengths.

### BERGER SENSITIVE HAND TAPPERS

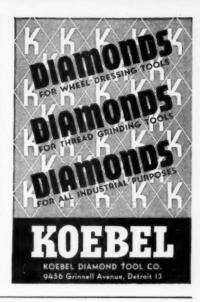
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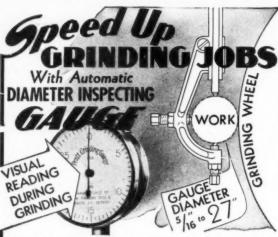
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APPRENTICESHIP PROGRAMS

The number of establishments with registered apprenticeship programs in the skilled trades in the United States has increased by more than 164 percent from the end of September, 1945, to the end of September of this year, reports William F. Patterson, Director, Apprentice-Training Service, U. S. Department of Labor.

Speaking at a conference of the American Society of Training Directors at Newcastle, Pennsylvania, Mr. Patterson declared the number of establishments with registered apprenticeship programs increased from 25,800 at the end of September, 1945, to 68,200 at the end of

September, 1946.

He also cited other increases in a p prenticessing local registered apprenticeship systems jumped from 4,840 in September, 1945, to 11,985 in September, 1946, and local joint management estimates from 1,894 to 3,843 during the same period.

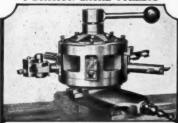
"Registered systems and establishments, he explained, are those approved by and listed with a State or Federal apprenticeship agency.

Mr. Patterson gave the following reasons for the great expansion of apprenticeship: during the depression vears when many iourneymen were out of work, industry lost sight of the need of training apprentices for normal production; during the war the armed forces took practically all young men who might have taken apprentice training, the lack of skilled workers in

some trades today, and the record production program anticipated for which thousands of more craftsmen will be needed.

He pointed out that this recognition is being sought as financial assistance from the Government is available for no more than two years to on-the-job trainees, while apprentices may receive this money up to four years. State agencies vested with the authority to approve establishments for veterans' training under the G. I. Bill should be extremely careful in examining these applications before recognition is granted that jobs be recognized as apprenticeable.

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Advisory Council to Housing Ex-pediter Wilson W. Wyatt, who also is the Administrator of the National Housing Agency. The council, made up of national officers of the Ameri-Legion. can Veterans Wars. Foreign American Veter-Committee. ans American Veterans of World War II (Amvets), and the Disabled American Veterans, studied the model ordinance at their meeting recently and as-sured the Expediter their memberships would work for its adoption by municipalities.

One paragraph of the model ordinance, the language and style to be adapted to local law and custom, reads:

ermit required or authorized to be issued by or pursuant to the building code of this City for the construction, repair, renovation, alteration, conversion or enlargement of any

building or other structure shall be issued to any applicant who has not received authorization therefor from the Federal agency or instrumentality empowered to grant such authorization, when such authorization is required by or under any regulation or order issued under or pursuant to the Veterans Emergency Housing Act of 1946 or the Second War Powers Act, 1942, as amended."

Some cities already have revised their building codes in such manner, and others have reported that their building inspectors are issuing few permits.

### CONSTRUCTION

A "model ordinance," proposed for adoption by cities in order to backstop the drive against illegal and unauthorized construction, has been prepared by the National Housing Agency.

The ordinance, based on laws already put into effect in several cities, would require that a builder have a construction authorization from a Federal agency before he could obtain a building permit from his local officials.

Strong endorsement of the proposed ordinance has been given by the Veterans





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#### "REAL INCOME"

The "real income" of the American people at the start of September, 1946, was \$1.06 or six cents on the dollar more than a year earlier, according to a study of what people earn and spend, made public by Investors Syndicate of Minneapolis.

"The gain in 'real income'," Investors Syndicate, in its latest monthly study of public purchasing power quickly explains, "results from a comparison with a letdown period that followed V-J Day in 1945.

"Cash incomes are higher than a year ago chiefly as a result of the gains registered by: investment and other incomes, and, to a somewhat less extent, by wages. Salaries, however, are lower than in August 1945.

"Cash expenditures also are well above August, 1945, being led by such items as food, miscellaneous products and services, and clothing.

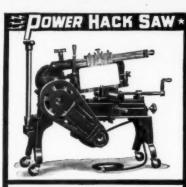
"The typical American consumer, on the average, nationally, in August 1946 had to pay at the rate of \$1.11 for the essential goods and services which he bought at the rate of \$1.00 in August, 1945. During July such living costs were \$1.00 a year earlier. It is impossible to measure the effect of black market prices on average living expenditures.

All costs reported here are based on items obtained in legal markets. Living costs in June, May, and April were \$1.03, in March, \$1.02 and February and January \$1.01,

and January \$1.01, all of which are contrasted with \$1.00 in the same months a year earlier.

"Real Income," in this Investors Syndicate study is measured by a doubly-weighted scale, with income from wages, salaries, investments and the profits from unincorporated business and farms on the one side; and the prices of goods and services which everybody must buy on the other side.

In this study Mr. and Mrs. American Public are presumed to share the nation's cash income from all sources and spend their money according to a typical budget.



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NEED FOR ENGINEERS

Future demand for engineering graduates will be more than twice as great as before the war, according to Karl T. Compton, president of Massachusetts Institute of Technology.

"Despite increased military and civilian demands during the war, the number graduating from engineering schools," he declared, "has declined steadily to allow this year of less than 7,000, including those in Army and Navy sponsored programs. This compares with a normal compared to the compared to plement early in the war of almost 15,000."

In an article appearing in Educational

Focus, Bausch & Lomb Optical Company publica-tion issued Nov. 11, Dr. Compton predicted that the nation's deficiency in technical manpower "will not be wiped out until 1952 at the earli-

Dr. Compton pointed out that during the war virtually all of the technical talent focused its attention the development of equipment and techniques for the single purpose winning war.

"Even tho a great deal of this research will have peacetime application, we have undoubtedly lost ground in our constructive efforts constantly to improve the standard of living. Further, we have drawn ervoir of funda-mental heavily on our resscientific knowledge because most of the war reconcerned search the application of science and any basic research was incidental to the

major task. We must therefore promptly replenish the supply of the 'raw materials' of engineering and science.'

The M.I.T. president added that during the war almost every company producing war equipment was dependent in some way on technical manpower.

"That this trend will continue in peacetime is borne out strikingly by a survey recently conducted among 125 companies thruout the US by a committee of American Society of Engineering Education.

The results indicate that the future annual demand for engineering graduates will be more than twice as great.



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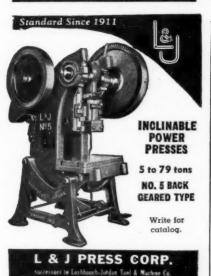


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### ECONOMIC STANDING

The 1947 research and educational program of the Committee for Economic Development, and additions to the membership of its Board of Trustees and national committees were announced by Chairman Paul G. Hoffman.

The research program's central aim is to help develop policies which will maintain high productivity and employment, he declared.

"In the early part of 1943," Hoffman said, "the Committee for Economic Develop-ment declared that a postwar goal of 53 to 56 million jobs was necessary to avoid

mass unemployment and was attainable. Business in general ac-claimed our setting that goal. But some criti-cized C E D for setting a fantastic objective which, its critics predicted, could never be reached. The most recent reports show more than 58 million employed civilians in the U.S.

"Today mere notion that a major depression is inevitable has to be at-tacked. It is no inevitable more than the idea that we had to have mass unemployment after VJ-Day. We can have a depression if we drift into it or do enough foolish things. On the other hand, we can think and act to stop it before it gets started.

'There are certain to be some fluctuations in a free economy, but if we begin to think now what can be done to these fluctuations WO have a chance to

avoid deep dips and the shock to all our institutions that a major depression would bring.'

The trustees have approved a program developed by the Information Committee. and have opened membership in CED to all businessmen and others interested.

Members will be kept in touch with postwar research on critical economic problems through the CED publications and regional institutes.

Reporting on the research phase of the program, Hoffman said 15 studies now are under way, including one on labormanagement relations.



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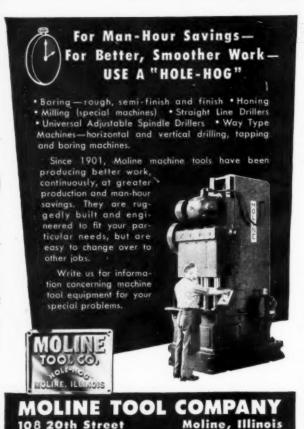
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DYNAMIC TESTING Present design trends toward greater efficiency and lightness and the ever increasing speed of modern machinery and transportation have emphasized the importance of dynamic forces as factors in design. Studies made by the American Society for Testing Materials and by others have shown that over eighty per cent of the service failures in machines and structural parts involve dynamic forces. Very few can be attributed to static forces alone.

The design engineer can carry out his dynamic testing by using specimens to

determine fundamental properties of materials in the initial design stages, but to check actual serviceability of the machine or structure, and to refine the design, the actual assemblies should be subjected to tests. No test, of course, could be as good as actual service. but this usually is impractical because it takes too long and is too expensive.

Mechanical oscillators were first developed for testing railroad bridges, but now they being used to test a wide variety of structures, aircraft, land vehicles of all kinds, buildings and foundations. Results of these determine tests such characteristics as the natural frequency of vibration of the structure, riding qualities of a vehicle, flutter, and fatigue strength.

To carry out these tests the Baldwin Locomotive Works Philadelphia, Pa., now

LA-1 Oscillator, a compact, portable machine for inducing vibrations in structures and assemblies.

In use, the oscillator, which weighs only 61 pounds, is attached to the structure or machine.

The centrifugal force produced by eccentrically supported weights, rotated so that all forces add in one direction and cancel each other in all other directions. provides the vibration for the test.

The force is steplessly adjustable either while running or stationary by turning the micrometer type knob.

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#### CORRECT THREADS

It is obvious that when threads are cut on the lathe, the threading tools must be ground with a high degree of accuracy as to form. In some places, a full set of thread tool gauges is kept at hand, to insure on this point. Such gauges are obtainable from manufacturers of tools, for both Acme and standard screw threads. Some gauges have also been observed which provide the correct form for tools used in turning the threads of worms, to match with worm wheels that have been cut with involute cutters. One company furnishing these various types of thread

tool gauges also provides a thread tool vernier. This tool has a sliding jaw. The vernier reads in thousandths of an inch on one side of the tool, and in 50ths of a millimeter on the opposite side.

As for gauges on the threads themselves, in different places, they have been very highly developed by some companies which make a specialty of their manufacture. Plug thread gauges in the smaller sizes are very often made double - ended, but those above 11/2" in diameter are usually made with a thread gauge at one end of the handle only. Larger sizes of double-end gauges are cumbersome to use, and are also easily damaged in the shop. One leadmanufacturer always makes the actual thread gauges separate from the handles, since this allows of very economical replacement. Ring thread gauges are generally used as separate units, but

in cases where it is desired to use them in a "Go" and "Not Go" gauging combination, as a single inspection tool, this manufacturer provides a twin ring holder for two such gauges, thereby making this possible.

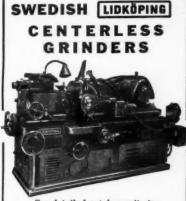
Something new under the sun has recently been observed in the form of a thread gauge which has retracting gauge segments. This tool can be readily taken from place to place, and is convenient for inspecting threads in large castings, or in work that is still in a machine. The gauge segments are retracted for placing inside threaded bore, and allowed to expand into the gauge threading.





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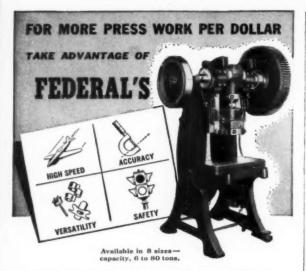
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### ALUMINUM WELDER

Shown publicly for the first time by Progressive Welder Company, Dept. BB, 3050 E. Outer Drive, Detroit 12, at the Metals Show in Atlantic City, is one of its new storage battery powered flash welders designed and developed for the flash welding of aluminum.

Altho stored energy was extensively used for resistance welding of aluminum, application was confined to fairly light sections and such operations as spot welding. Reason for the use of stored energy, of course, is the excessive power needed for the welding of aluminum. Stored

energy machines are claimed to have the ability to provide high weld current rates with a considerable lower line load than for a-c machines.

Of the three basic types of stored energy machines - magnetic, condenser discharge, and battery powered - this company states that only the battery type lends itself to flash welding, since flash welding demands a continued current flow rather than single "shot" of short duration as provided in other types.

In addition, another problem presented when flash welding aluminum is the extremely rapid upset required compared other materials. This calls for high rates of acceleration and deceleration the upset mechanism - combined with high upset forces. This problem was met in the Pro-

gressive machine thru the use of a new type of gearing and clutch.

The need for such a machine has been recognized for some time. The manufacturers state that their lack has probably retarded as much as anything the wider scale use of extruded aluminum as a fabricating material.

Conventional a-c machines imposed too heavy a line demand for their use even in metropolitan areas where power supply is adequate for the welding of other materials.

The battery operated flash welder may be operated with a simple cam timer.



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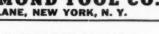




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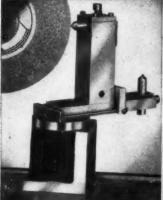
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Abrasive Cloth, Paper, Disc, Belts, Wheels, Stones, Etc., 83, 85, 132, 133 Air-Operated Equipment (Look for specific item) Angle Dressers, 228, 389 Angles, 67

Balancing Machines, 11, 205 Bar Feeds, Inside Back Cover Bearings, Ball, 377 Bearings, Roller, 377 Bearings, Olliess, 252 Benches, Cabinet, 240 Blades, Cutting-off, 125 Blocks, Magnetic, 353 Borescopes, 168 Borescopes, 168
Boring, Drilling and Milling Machines, 161, 264, 290, 369, 382
Boring, Drilling and Tapping Machines, 382
Boring Heads, 77, 262, 241, 310
Boring Tools, 91, 112, 239
Boxes, 8bop, 154
Braker, Press and Bending, 29, 33, 37
Braker, Band Saw, 335
Braker, Band Saw, 335
Braker, Band Saw, 335
Braker, Band Saw, 335 Brazer, Band Saw, 335
Breakers, Drill Chip, 32
Broaches, 145, 243, 251
Broaches, 145, 243, 251
Broaches, Wire Wheel, 42
Buffers, Portable Electric, 250
Burs, 41 Bushings, Drill Jig, 98, 281, 284, 312

Callipers, 337
Carbides and Special Cutting Tools, 81, 94, 112, 276, 283, 334, 349, 333
Carbides and Special Cutting Tools, 81, 94, 112, 276, 283, 349, 349, 349
Centers, Lathe, 7
Centers, Bench, 123
Centers, Live, 57, 351
Chains and Sprockets, Back Cover
Chamfering Machines, 99
Charts, Flexible Coupling, 256
Cherrying Attachments, 186
Chucking and Indexing Fixtures, 277
Checks, Collet, 15, 178, 231, 259, 335
Chucks, Brill, 24, 25, 46, 79, 325
Chucks, Drill, 24, 25, 46, 79, 325
Chucks, Magnetle, 50, 149, 193
Chucks, Magnetle, 50, 149, 193
Chucks, Magnetle, 50, 149, 193
Chucks, Werenchiess, 227
Clamps, 4, 88, 97
Clutches, 52, 95, 301, 340
Coating Equipment, 373
Collets, 15, 128, 376
Coulet, 15, 128, 376
Coolant Systems, 68
Counterboring Machine, 300
Counterboring Machine, 300
Counterboring Machine, 300
Counterboring Machine, 300
Countersinks, 360
Couplings, Flexible, 256
Couplings, Flexible, 256
Couplings, Flexible, 253
Cutters, Machines, 123
Cutters, Machines, 123
Cutters, Milling, 110, 186, 274
Cutters, Milling, 110, 186, 274
Cutters, Milling, 110, 189, 166, 167, 329, 333
Cylinders, Hydraulle and Pneumatic, 14, 293

Demagnetizers, 193, 280, 381 Diat Indicators, 137 Diamond Holder, 152 Diamond Powder, 283, 327 Diamond Wheels, 327 Diamonds and Diamond Tools, 172, 327, 371, 372, 387 Die Heads, Threading, 7, 268 Die Jacks, 343 Die Making Machines, 31, 389 Die Making Machines, 31, 389 Dies, 3, 27, 153, 288, 401 Die Set Pullers, 65 Die Sets, 40, 97, 181, 332, 381 Die Springs, 97 Die Sets. 40. 97, 181, 332, 381
Die Springs, 97
Dividing Heads, 158, 193, 385
Dowel Plns, 97, 342
Dressers, Emery Wheel, 394
Dressers, Radi: & Angle, 288, 389
Dressing Fixtures, Grinding Wheel, 154, 172, 228, 344
Drill Cases, 341, 374, 379
Drill Gases, 341, 374, 379
Drill Gases, 341, 374, 379
Drilling Machines, Hench, 180, 380
Drilling Machines, Multiple Spindle, 34, 219, 345, 391
Drilling Machines, Multiple Spindle, 34, 219, 345, 391
Drilling Machines, Vertical, 219, 359
Drilling Drilling, Deep Hole, 75
Drillis, Deep Hole, 75
Drillis, Deep Hole, 75
Drillis, Portable Electric, 126
Drives, Gear Shift, 90
Drives, Motor, 196, 297, 308
Duplicating Machines, 60
Dust Control Equipment, 255, 328, 404
Dyes, Layout, 345, 377

End Mills, 7 Engraving Instruments, 289 Envelopes, Shop, 256 Etchers, 115 Feeders, Work, 375 Feedrall, Electric, 114 Files, 83, 187, 295 Files, Rotary, 15, 171, 295, 375, Filing Machines, 235, 351

Filters, 62 Filters, Air. 44 Filrishing Machines. Abrasive, 233 Flexible Shaft Equipment, 15, 49, 121, 139, 347 Forming Machines, 387 Furnaces, Heat Treating, 250, 267, 299, 332, 399 Gages, 28, 74, 80, 113, 122, 137, 188, 281, 372, 397
Gages, Ph., 113
Gears and Gear Units, 296, 345, 387
Goggles, Safety, 333
Grinders, Abrasive Belt, 175, 220, 332, 379
Grinders, Alr, 61, 249, 358, 388
Grinders, Alr, 61, 249, 358, 388
Grinders, Bench, 64, 218, 322
Grinders, Carbide Tool, 36, 297
Grinders, Centerless, 385
Grinders, Centerless, 385
Grinders, Cylindrical, 201
Grinders, Cylindrical, 201
Grinders, Prill, 31, 64, 177, 305
Grinders, Hydraulic, 103
Grinders, Pedestal, 64, 99
Grinders, Potable Electric, 147, 194, 195, 358, 366
Grinders, Portable Electric, 147, 194, 195, 358, 366
Grinders, Portable Electric, 147, 194, 195, 358, 366
Grinders, Grinders Gages, 28, 74, 80, 113, 122, 137, 188, 281, 372, 397

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Grinders, Surface, 108, 118, 218 Grinders, Swing Frame, 144 Grinders, Tap. 321 Grinders, Thread, 7 Grinders, Tool and Cutter, 2, 8, 9, 31, 64, 177, 307 Grinding Wheels, 29, 132, 133, 172, 201, 220 Grooving Tools, 367 Guards, 311 Guides, Saw, 317 Guides, Tap, 373

Hammers, 146, 301 Hand Tools, 117 Heads, Facing, 176, 310 Heads, Tapping, 290 Heat Exchangers, 166 Helmets, 393
Hinges, 276, 383
Holders, Knurl, 244, 294
Holders, Tap, 82, 104
Holders, Tool, 4, 79, 98
Honing Machines, 245 Hydraulic Equipment (Look for specific item)

Indexing Heads, 274 Indicators, 74

Jacks, 375 Jig Borers, 89 Drill, 218 Jigs. Drill. 218 Jigs and Fixtures, 383 Joints, 79

#### Keyseaters, 156, 304

Lathe Attachments, 193 Lathes, Automatic, 7, 11, 179, 205 Lathes, Rench, 29, 89, 179 Lathes, Engine and Toolroom, 2, 39, 54, 139, 174, 179 Lathes, Polishing, 107, 121, 179, 199, 229, 349, 351, Lathes, Precision, Front Cover, 130, 165, 179, 271 Latnes, Precision, Front Cover, 130, Latnes, Production, 69, 179 Latnes, Threading, 86, 179 Latnes, Turret, 7, 11, 179, 205 Lighting Equipment, Shop, 124, 182 Locaters, Optical, 200, 309 Lubricants, 6, 141 Lubricating Systems, 191 Lubricators, 65, 156, 191, 376

Lubricators, 65, 156, 191, 370

Magniffers, Head Rand, 318

Maintenance Materials, 273

Maintenance Matchinety, 348

Mandrels, 222, 287

Manual, Punch & Die Making, 257

Markers, 700, 117

Marking Machines, 347, 349

Material Holders, Pneumatic 294

Measuring Instruments, 24, 275

Micrometers, 348

Micrometers, 348

Milling Machine Atti 48, 158, 186, 325

Milling Machines, Auc. 48, 211, 223, 349

Milling Machines, Bench, 29

Milling Machines, Hend, 322

Milling Machines, Hend, 323

Milling Machines, Hercision Instrument, 170, 264

Milling Machines, Universal, 158

Milling Machines, Universal, 158

Milling Machines, Universal, 158

Milling Machines, Vertical, 102, 161, 180, 223, 226

Motors, 90, 121, 333

Numbering Machines, 216

Oil Seals, 370

Paper, Blueprint & Tracing, 369
Partograph Machines, 89, 143
Photo Copy Equipment, 329
Presses, Proto, 29, 183, 262, 282
Presses, Drill, 20
Presses, Foto, 151, 156, 180, 282, 315, 367, 379, 386
Presses, Hydraulic, 29, 37, 119, 183
Presses, Hydraulic, 29, 37, 119, 183
Presses, Hydraulic, 29, 37, 119, 183
Presses, Pruch, 96, 151, 173, 298, 307
Projectors, Profile, 89

Pullers, 65 Pulleys, 361 Punches, Bench, 345 Pumps, 338 Pumps, Coolant and Lubricant, 26, 68, 84 Pumps, Hydraulic, 35, 128 Punches, 34, 366 Pyrometers, 296

Reamers, 99, 249, 287, 333 Reamers, 99, 249, 281, Rectifiers, 193 Reel Stands, 225 Retaining Rings, 101 Riveting Machines, 377 Riveting Machin Roll Feeds, 225

Sanding Equipment, 249, 306
Saw Blades, Band, 78, 164
Saw Blades, Hack, 164, 314
Saw Sharpenera, 381
Sawing and Filing Machines, 235, 351, 389
Sawing Machines, Band, 47, 53, 59, 72, 87, 137, 164
Sawing Machines, Carculas 14, 289
Sawing Machines, Hack, Inside Front Cover, 121, 137, 193
Sawing Machines, Hack, Inside Front Cover, 121, 137, 138
Saws, Electric Portable, 157 

Sine Plates of 3.

Sine Plates of 3.

Shorting Machines, 158, 203, 302

Sockets, 79

Sockets, 79

Sockets, 79

Spacing Collars, 212, 215, 328

Speed Reducers, 237, 296, 329

Staking Machines, 248

Stamps, 266, 385

Steel and Steel Stork, 63, 137

Steels, 63, 134, 137, 169, 209

Stock Stands, 294, 352

Stock Tubes, 359

Stud Setters, 45, 178, 249

Superfinishing Machines, 11, 205

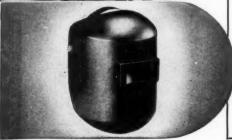
Switches, 193

Tables, Drill & Vise, 106 Tables, Elevating, 275, 377 Tables, Retary and Index, 102, 339, 387 Tap Extractors, 162 Tap 5. Table 3. Tap 5. Table 3. Tap 5. Table 3. Tap 5. Table 3. Tap 5. T

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#### **Index to Advertisers**

Davis & Thompson Co.   349	Abart Gear & Mach. Co.   296	Carroll & Jamieson Machine Tool Co. 349 Carter Products Co. 182 Center Scope Products. 200 Central Meh. Works Co. 69 Challenge Machinery Co. 129 Chandler Tool Co. 310 Chicago Heart Works. 386 Chicago Theumatic Tool Co. 249 Chicago Theumatic Tool Co. 325 Chicago Wheel & Mig. Co. 194-195 Cincinnati Electrical Tool Co. 404 Clicinnati Electrical Tool Co. 404 Clicinnati Milling Machines S. 99 Circular Tool Co. 269 City Machine Company. 154 Cleveland Automatic Machine Co. 311 Commander Manufachine Co. 355 Come Automatic Machine Co. 355 Come Automatic Machine Co. 355 Come Automatic Machine Co. 375 Come Automatic Machine Co. 375 Conner Tool & Cutter Co. 375 Conner Tool & Cutter Co. 375 Conner Tool & Cutter Co. 355 Conway Chich Co. 355 Conway
Buffalo Meby Co	B-H Instrument Co.   268	Danis Machine Specialties.       97-332         Davis & Thompson Co.       349         Dayton Rogers Mfg. Co.       328         Dearborn J. W.       277         Delloy Metal Corp.       329         Derbyshire Inc. F. W.       170         Desmond-Stephan Mfg. Co.       172         Desmond-Stephan Mfg. Co.       182         Detroit Stampin Co.       38         Diamond Tool Co.       32         Dockson Corporation       32         Dorman Machine Tool Wks.       316         Dreis & Krump Mfg. Co.       147         Drive-All Mfg. Co.       196-308         Dykem Co.       377
	Canedy-Otto Mfg.         Co	Fakes & Co., Jos. B.       294         Famco Machine Co.       282         Fearless Tool Co.       145

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H & H Research Co	McGill Manufacturing Co.   378
Ideal Industries, Inc	Moore Industries, J. C
J. & S. Tool Co.         228-288-389           Jacobs Mig. Co.         24-25           Janette Mig. Co.         320           Jarvis Co. Chas. L.         15           Jefferson Machine Tool Co.         385           Jessop Steel Co.         209           Johnson Machine & Press Corp.         367           Johnson Mig. Corp.         53           Jones & Lamson Machine Co.         7	National Aeme Co

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You can again get "MAXI" surface treatment on "Greenfield" Tabs at no extra cost.

"MAXI" was a pre-war champion when it came to tap performance. Today's "MAXI" is better than ever. Intensive research in "Greenfield's" metallurgical laboratory during the war has produced better formulas for surface treatment.

#### WHAT IS "MAXI" FINISH?

It is a heat treatment applied to High Speed Steel tools which imparts a surface hardness greater than that of an untreated tool. This surface is applied by a chemical bath. It does not affect the basic character of the metal nor the size of the tap.

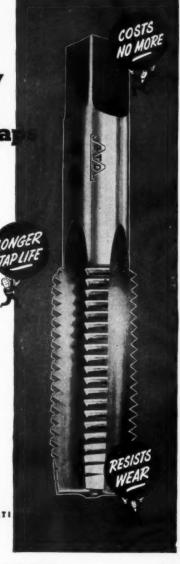
#### COSTS NO MORE!

You can get a "MAXI" surface treatment on any "Greenfield" HIGH SPEED tool, regular or special, in any size at no additional cost, Simply add the word "MAXI" when ordering.



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Nicholson & Co., W. H. 222	Smit & Sons, J. K
Nelsen, Inc.   351   Nielsen, Inc.   351   Nielsen Tool & Die Co.   148   Norgren Co. C. A.   191   Numberall Stamp & Tool Co.   216	South Bend Lathe Works. 120
Nielsen Tool & Die Co148	Specialty Equipment Machinery Corp. 336
Norgren Co., C. A	Spencer Turbine Co105
Numberall Stamp & Tool Co216	Spiral Mfg. Corp
	Spiral Mrg. Corp. 333   Standard Elec. Tool Co. 66   Standard Gage Co. 25   Standard Machinery Co. 44   Standard Pressed Steel Co. 126   Standard Transmission Equipment Co. 278   Stark Tool Company. 256
	Standard Machinery Co. 46
	Standard Pressed Steel Co
Oliver Instrument Co	Standard Transmission Equipment Co278
Oliver Machinery Co	Stark Tool Company
Openid Machine Works Inc. 288	Stokernnit Corn 964
Charles Marchine Works and Milliam Milliam Co.	Strand & Company, N. A. 347
	Starrett Co. L. S
	Sun Oil Co141
	Sun Oil Co
Paddock Tool Co	Syntron Company
Pellow Machine Co	against company minimum minimum minimum day
Persson Mfg. Co343	
Pellow Machine Co.         302           Persson Mfg. Co.         343           Plunket Machine Co.         J. E.           353         343           Plunket Machine Co.         293           Porst Bros. Mfg. Co.         231           Porter-Cable Machine Co.         155           Potter & Johnston Mch. Co.         167           Pratt & Whitney.         41           Preceive Products Co.         366           Procunier Safety Chuck Co.         82           Production Machine Co.         351           Producto Machine Co.         56           Pyrometer Instrument Co.         296	war and the same of the same o
Pneumatics, Inc293	Tannewitz Works         59           Tatra Tool Co.         346           Taylor & Fenn Company         34-180
Portor Cable Machine Co. 155	Taylor & Form Company
Potter & Johnston Mch. Co	Taylor Meh. Co. 257
Pratt & Whitney 41	Tech Tools
Precise Products Co366	Templeton, Keniy & Co375
Procunier Safety Chuck Co	Thermo Electric Mfg. Co333
Producto Machine Co. 56	Thomas Hoist Co
Pyrometer Instrument Co296	Titan Tool Co
	Tool Specialties Co
	Torit Manufacturing Co255
	Trico Fuse Mfg. Co
Quality Tool Works276	Tripley Machine Tool Corp. 205
	Troyke Mfg. Co
	Taylor & Fenn Company         34 180           Taylor Mch. Co.         267           Taylor Mch. Co.         267           Tech Tools         109           Templeton, Keniy & Co.         375           Templeton, Keniy & Co.         375           Thermo Electric Mfg. Co.         227           Threadwell Tap & Dio Co.         153           Titan Tool Co.         378           Torit Manufacturing Co.         371           Trice Fuse Mfg. Co.         156           Tringle Products, Ltd.         403           Tripke Mfg. Co.         385           Troyke Mfg. Co.         387
P & T. Tools 104	
Racine Tool and Machine Co. 55	If & Hollman Makes Com
R & L Tools.         104           Racine Tool and Machine Co.         55           Reading Machine Co.         304           Reich Mfg. Co.         164           Reid Brothers Co.         118	U. S. Hoffman Mchy, Corp
Reich Mfg. Co., J. R164	The state of the s
Reid Brothers Co118	
Resco	
Rivett Lathe & Grinder, Inc 2	Vanderwall Co., E. H342
Resco         289           Riley & Gechr, Inc.         373           Rivet Lathe & Grinder, Inc.         67           Robbins Eng. Co.         67           Rockford Clutch Div.         30           Rockford Machine Tool Co.         203           Rodgers Hydraulic, Inc.         119           Rogers, V. F.         341           Rofor Tool Co.         61           Rouse & Co.         6           Royal Oak Tool & Machine Co.         38           Rusnok Tool Works.         331           Ruthman Machine Co.         26           Rutland Tool Service.         385           Ryerson & Son, Inc., Jos. T.         134	Vanderwall Co., E. H.         342           Victor Machinery Exchange.         394-395-396-397           Victor Saw Works.         164           Vonnegut Moulder Corp.         144
Rockford Clutch Div301	Vonnegut Moulder Corp.
Rockford Machine Tool Co	
Rogers, V. F. 341	
Rotor Tool Co 61	
Rouse & Co., H. B232	Wade Instrument Co256
Royal Oak Tool & Machine Co36	Waldes Kohineer, Inc.         101           Walder Co., O. S.         50           Walker Turner Co.         121           Walker Surface         370           Walker Surface         370
Ruthman Machine Co. 26	Walker Co., O. S 50
Rutland Tool Service385	Walker-Turner Co121
Ryerson & Son, Inc., Jos. T134	Walton Co. 379
	War Assets Administration 02 02
	Wardwell Mfg. Co
	Warren City Mfg. Co
S. & E. Machine Products259	Weber Machine Corp284
& S Machine Works	White Dental Mer Co. 9 9
Sales Service Machine Tool Co151	Whitney Metal Tool Co. 3.49
San Angelo Foundry & Machine Co387	Willey's Carbide Tool Co. 326
Santord Manufacturing Co218	Wilson, K. R. 29
Schmaria Tool & Engineering Co. 382	Witter Mes Co. 76
Schmidt Inc., Geo, T., 347	Wolco Tool Div
Schultz & Anderson Co342	Woods Engineering Co272
S. & E. Machine Products.         259           8 & S. Machine Works.         333           Sales Service Machine Tool         51           San Angelo Foundry & Machine Co.         387           Sanford Manufacturing Co.         218           Schauer Machine Co.         355           Schmidt Inc. Geo.         342           Schmidt Inc. Geo.         347           Schwild Inc. Geo.         362           Screw Machine Specialty Co.         383           Seneca Falls Machine Co.         107           Service Machine Co.         173           Sererance Tool Industries.         163           Sheldon Machine Co.         271	Walls Sales Corporation.         3710           Walton Co.         362           War Assets Administration.         92-93           War Assets Administration.         92-93           Wardwell Mfg. Co.         307           Warren City Mfg. Co.         37           Weber Machine Corp.         284           Wells Mfg. Corp.         47           White Dental Mfg. Co., S. S.         139           Williamer Metal Tool Co.         348           Wilson, Earbide Tool Co.         326           Wilson, Earbide Tool Co.         29           Winter Bros.         25           Wolte Mfg. Co.         275           Woods Engineering Co.         36           Wyzenbeek & Staff, Inc.         157
lenges Falls Machine Co. 107	
lervice Machine Co	
Severance Tool Industries163	Volo Comba Cl. W. C
Sheldon Machine Co271	Yohe Supply Co., Wm. S
igourney Tool Co380	2005 AllE. CO148
imonds Abrasive Co	
ize Control Company	Zeiss, Inc., Carl318



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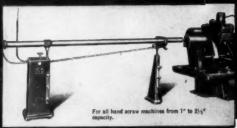
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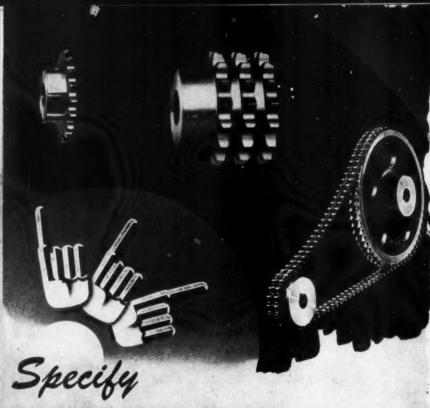
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